TAG Heuer
PROFESSIONAL TIMING

CHRONOPRINTER 540

User's Manual

Version 08/2008

Table of contents

1. The Keyboard **3**
2. Rear Connectors **4**
3. Quick operation guide **5**
3.1. Battery installation & replacement 5
3.2. Switch the CP 540 ON and Synchro 5
4. START-UP MENU GUIDE & FLOW CHART **7**
5. Menu description before opening up a new run **10**
5.1. Timing Modes 11
5.1.1. Chrono Mode 11
5.2. Parameters 12
5.2.1. Precision 12
5.2.2. Lock Time (multiple impulse filtering) 12
5.2.3. Numbering (except PTB SEQ) 12
5.2.4. Inputs Status 13
5.2.5. LCD Contrast 13
5.2.6. LCD Backlight 13
5.2.7. LCD Delay 13
5.2.8. Beep 13
5.2.9. RS232 (PC) 14
5.2.10. Ethernet 14
5.2.11. Language 14
5.3. Speed 14
5.4. Printer 15
5.5. Download 15
6. Keyboard shortcuts **16**
7. Special characters memorized, printed and sent to the PC **17**
8. Special function: RESET CP 540 **17**
9. To open a new run (added or not to a previous run) **18**
9.1. Addition of runs 19
9.2. BIBO rule 19
9.3. Ranking (F + ◄┘) 19
9.4. Rank a Run 19
10. The existing menus when a run is opened **20**
11. Description of the menu (when a run is open) **21**
11.1. Mass Start or Group Start (GRP) 22
11.1.1. Start with a timing impulse 22
11.1.2. Start a defined time 22
12. Changing the paper roll **23**
13. Autonomy / Batteries **24**
14. Information about Timing Modes **25**
15. Example of Timekeeping sessions **27**
15.1. SEQUENTIAL Mode 27
15.2. NET TIME Mode 28
15.3. PARALLEL SEQUENTIAL Mode 30
15.4. PARALLEL DIFFERENTIAL Mode 32
15.5. TRAINING Mode 33
16. Download a new version of Software and/or language **34**
17. RS232 and Ethernet Protocol **35**
18. RS232 Display Output Protocol **40**
18.1. NET TIME and START – FINISH modes 40
18.2. DUAL Mode 41
18.3. Miscellaneous Message 41
18.4. Display with 6 and 9 digits display example: 41
18.5. Single Display with 6 showing SPEED 41
19. ETHERNET LINK CONFIGURATION **42**
19.1. Configuration of your PC IP address 42
19.2. In SKI PRO, MSPORT PRO etc. 43
19.3. Ethernet connection test : 44
20. Technical specifications **45**
21. Note **46**

1. The Keyboard

ON/OFF	Power ON – Hold **ON** down for 5 seconds to turn power ON Power OFF – Press **F** and follow the instructions on the LCD display.
F	Menu – To enter or to exit the menu and sub-menus
▲ ▼	UP and DOWN keys to explore the menu and to scroll through the unassigned memorized times DOWN key to deactivate the Automatic numbering of the channels
◄┘	**ENTER** – to confirm menu selection, time, date or competitor number in the **RECALL** function.
R	**RECALL** – to access the unassigned memorized times of a channel for identification with a competitor number. Direct times identification is also possible.
*	**ERROR** – to cancel a wrong number you entered or to confirm an option. Interruption of the printing. Numbering of forerunners with * + N°
0 - 9	Numerical keyboard – to enter a time, the date, a competitor number or a distance.
E1 – E4	To confirm a competitor number for one of the channels. False START, INTER or FINISH and confirmation of a channel deactivation ▼ + **(E1 – E4)**.
1 – 4 **Green**	Manual keys for timing impulses or start the time (synchronisation)
1 – 4 **Red**	Manual keys to unblock and block the External inputs (**Input 1 – 4**). Inputs are blocked when a black bar is shown on the LCD display ▬

Warning

The manual timing keys (1 to 4) do not guarantee timing precision. Only two simultaneous impulses can be processed at a time from the manual keys

2. Rear Connectors

INPUT 1 to 4 — Inputs for timing impulses.
Working contacts without potential (short circuit or open collector)
Ex: Manual contactor (HL18), photocells (HL2-31 / HL2-35), Start Gates (H7-1 / HL7-3), radio receiver (HL610, HL620 etc)
Respect the correct polarity!

POWER — For an external power supply.
HL540-1 adaptator (110-220Vac / 12 Vdc) or 12Vdc batteries via HL520-17 connection cable.

RS232 — Bidirectional communication with a PC (ON LINE or OFF LINE) with selectable baud rates (2400 / 4800 / 9600 Bds (default) and 32k or 56k Bds)
Upgrade of the new software for CP540
Timing data transfer from one CP 540 to another.
With “Display Mode”, standard communication with **TAG Heuer** or Alge displays boards

ETHERNET — Bidirectional communication with a PC or a Network (LAN) with other CP540, PC display board or printer.

3. Quick operation guide

The exceptional performance of Chronoprinter CP 540 is guaranteed with simplicity of use, the hallmark of **TAG Heuer** timing philosophy

3.1. Battery installation & replacement

To open the battery cover, use your thumbs to firmly push it in the direction of the arrow. Insert the batteries respecting the correct polarity as indicated at the bottom of the compartment.

WARNING

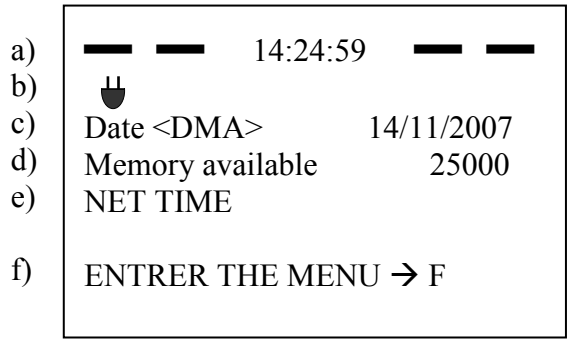
To guarantee the security of your timekeeping, it is necessary to use your CP 540 with the internal batteries in a good state or with the Docking - BATT.

Always remove the batteries if you don't use your CP 540 for several days.
If you forget this action, the batteries could leak and seriously damage the device. The warranty does not cover this problem.

The time of day, the date, the memorized runs and the selected parameters are saved by a small internal battery.

3.2. Switch the CP 540 ON and Synchro

1) Press **ON** for 5 seconds
2) The LCD display will show



LCD Screen

a) 4 black bars indicating that the external Inputs are blocked (1 to 4). The time of day is memorized in the CP540 (internal or after a **SYNCHRO**).
b) Symbol indicates you that the power supply is connected
c) The date
d) The memory available
e) The Timing Mode used the last time
f) How to enter the menu.

Innovation

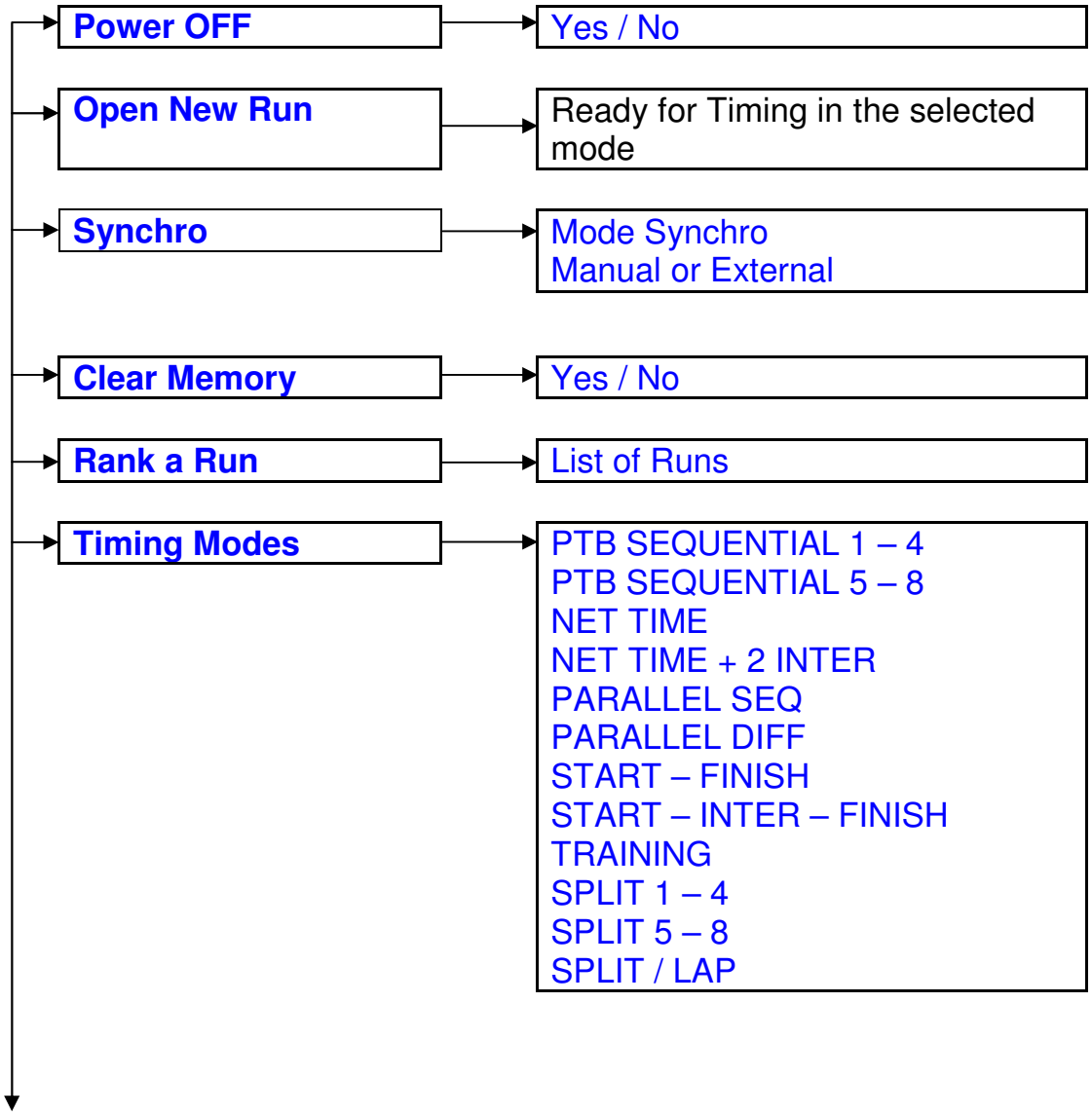
The CP 540 provides a visual (on the LCD) and audio alarm if an external input remains in short-circuit. This feature allows you to observe the status of TAG Heuer's new "direct-response" photocells (HL2-31 & HL2-35 – serial number up to 7000) and allows the timekeeper to instantly determine if a photocell is out of alignment.

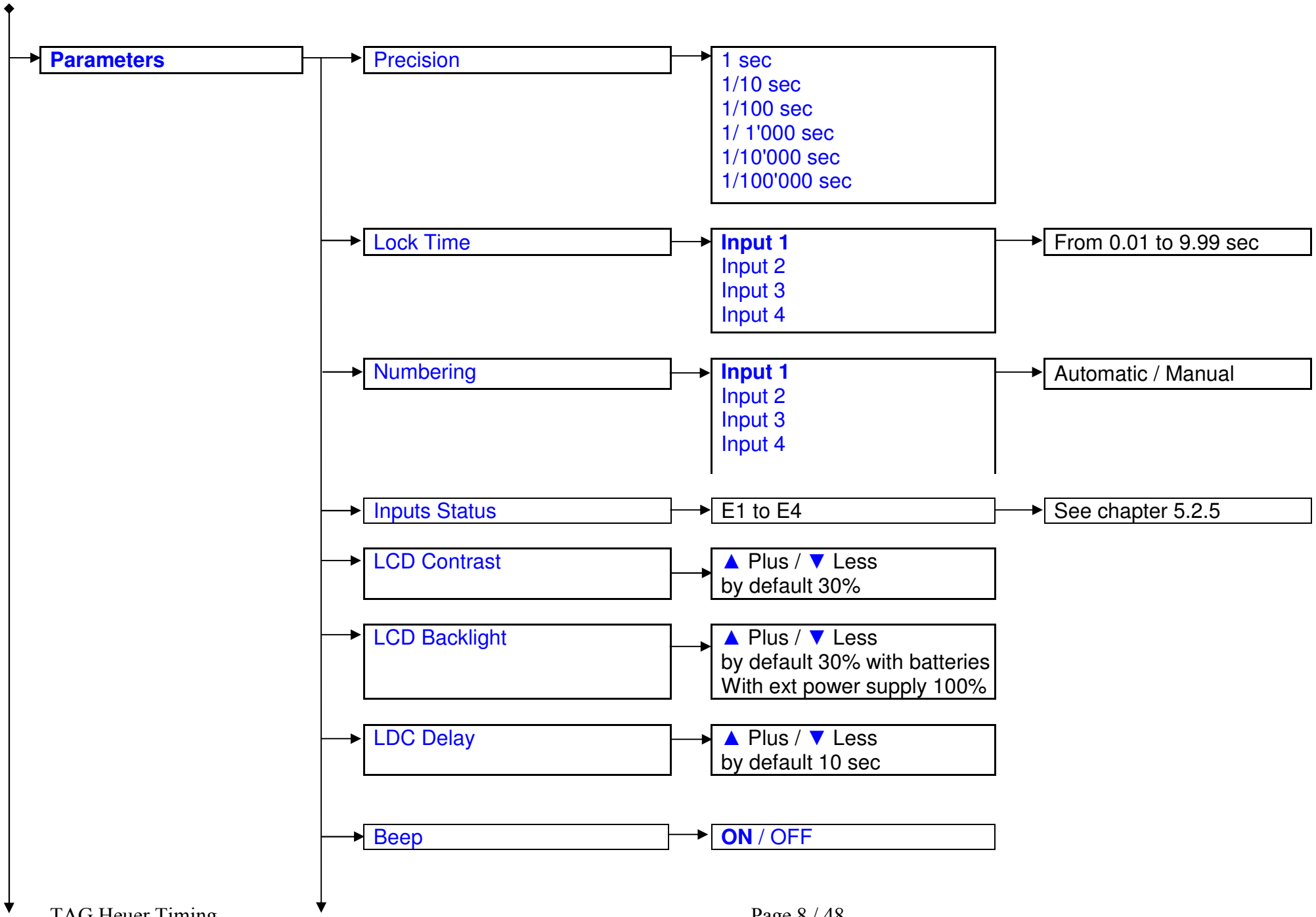
3) The same message is printed with the device N° (ID) and the software version, along with timing mode and the main parameters used during your last timing session.
4) If the CP540 doesn't print, enter the menu (**F**), select **PRINTER ON** and validate ◄┘. You should check your batteries and replace if necessary.
5) Example of action when you start a new Timing session
   a) Enter into the menu (**F**)
   b) Clear the memory.
   c) Timing mode (you may change this if desired)
   d) Parameter (If changes are needed – Precision, Blocking, etc.)
   e) Synchro (manual at Time of the Day to correspond with other systems, or time proposed by you on the CP 540, or start at 00:00)
   f) Open a new run (begin the timing session)

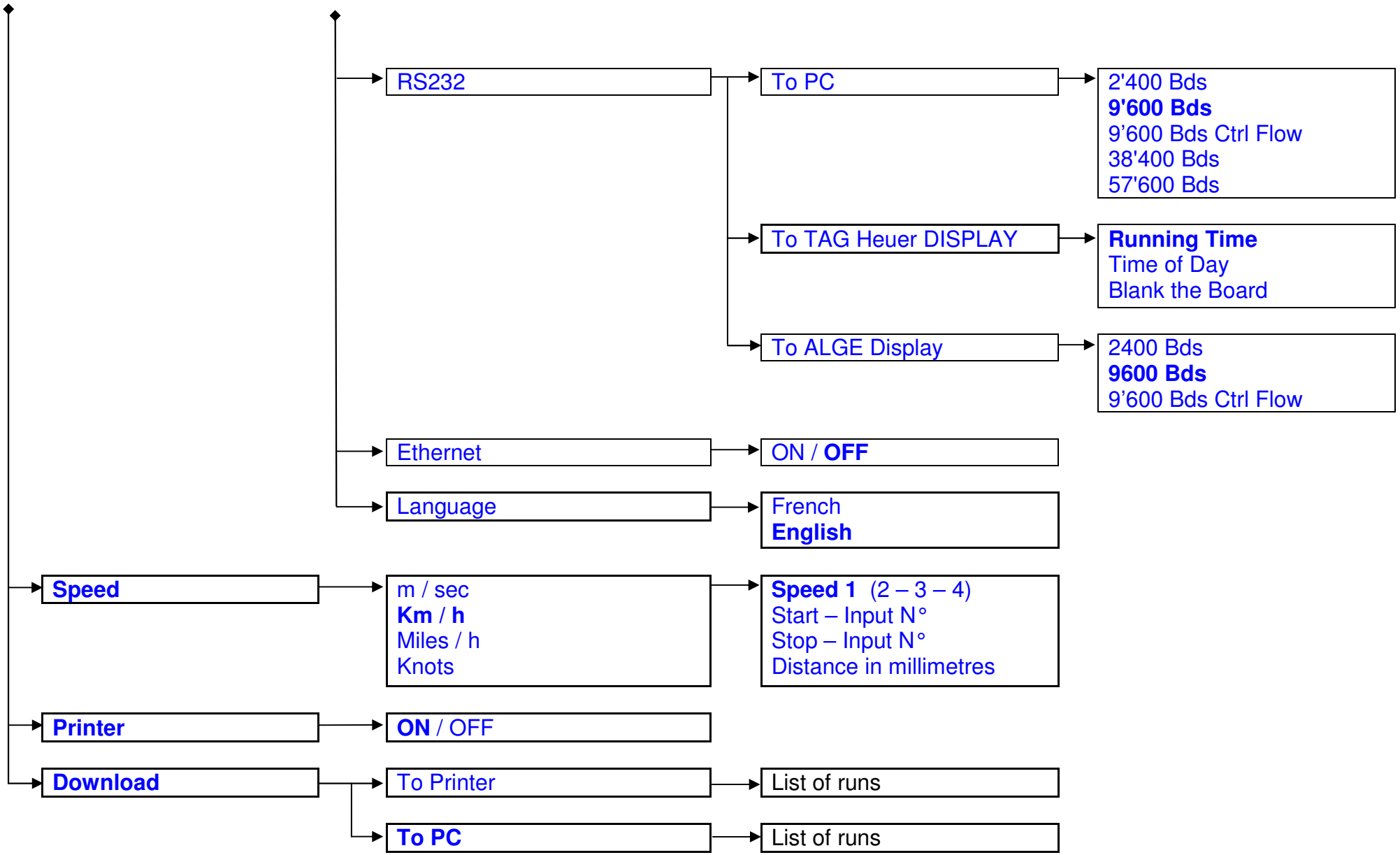
PLEASE NOTE

If the same Timing Mode is reconfirmed through this menu (Mode Chrono) sequence, the parameters by default are restored.

4. START-UP MENU GUIDE & FLOW CHART




Parameters
Precision
1 sec
1/10 sec
1/100 sec
1/ 1'000 sec
1/10'000 sec
1/100'000 sec
Lock Time
Input 1
Input 2
Input 3
Input 4
From 0.01 to 9.99 sec
Numbering
Input 1
Input 2
Input 3
Input 4
Automatic / Manual
Inputs Status
E1 to E4
See chapter 5.2.5
LCD Contrast
▲ Plus / ▼ Less
by default 30%
LCD Backlight
▲ Plus / ▼ Less
by default 30% with batteries
With ext power supply 100%
LDC Delay
▲ Plus / ▼ Less
by default 10 sec
Beep
ON / OFF


RS232
To PC
2'400 Bds
9'600 Bds
9'600 Bds Ctrl Flow
38'400 Bds
57'600 Bds
To TAG Heuer DISPLAY
Running Time
Time of Day
Blank the Board
To ALGE Display
2400 Bds
9600 Bds
9'600 Bds Ctrl Flow
Ethernet
ON / **OFF**
Language
French
English
Speed
m / sec
Km / h
Miles / h
Knots
Speed 1 (2 – 3 – 4)
Start – Input N°
Stop – Input N°
Distance in millimetres
Printer
ON / OFF
Download
To Printer
List of runs
To PC
List of runs

5. Menu description before opening up a new run

To enter the MENU, press **F**. To select an option use the ▼and ▲keys and validate with ◄┘.

⇨ **Power OFF**	Switch off the device.
⇨ **Open New Run**	Start of a new timing session after having closed the previous run.
⇨ **Synchro Manual or External**	When the CP 540 is powered ON, the memorised Time of Day and Date proposed is the one used during the last timing session. Use Synchro Manual for a new Time of Day setting or to synchronize with other systems to a preset Time of Day. (Do not forget to introduce the Date) It is also possible to synchronize the time from 00:00 (only in SPLIT and SPLIT/LAP mode) when a restart back to zero may be required.
⇨ **Clear Memory**	Use only when you start a new timing session and you are sure you do not need to retain previous runs in memory!
⇨ **Rank a RUN**	of a single run, or the addition of two or more runs.

(Example: ranking from the addition of 3 runs)

List of runs	
03 + 02 T	General ranking from the addition of run 03 and 02 T
► **03**	Ranking of run 03 (added to run 02 T)
02 + 01	General ranking from the addition of runs 02 and 01 (calls it 02 T)
02	Ranking of run 02 (added to run 01)
01	Ranking of only run 01

Or with 2 run added (ex 03 + 01). First select one of the 2 runs.

5.1. Timing Modes

5.1.1. Chrono Mode

PTB SEQUENTIAL 1 to 4 and 5 to 8

Sequential recording of time-of-Day on 4 or 8 channels (if 2 CP 540 are connected together with RS232 connection) directly to an external PC.
Uses bi-directional communication with a PC running **TAG Heuer** or Split Second (USSA / CLUB / NASTAR) software, where it is possible to print all net times, current ranking and even the competitor name and affiliation directly on the CP 540 printer.

NET TIME

Stand-Alone net timing using Start and Finish times with automatic or manual numbering. Keypad shortcuts of corrections and RECALL of memorized times for later identification or modification.
Ranking list and total time results, including if several runs are added.
BIBO avalable in Alpine Ski mode.

NET TIME + 2 Inter

Start, with 2 intermediate times and finish time. Automatic or manual numbering. Ranking and addition of runs.

PARALLEL SEQUENTIAL

Independent Start and Finish times on parallel race courses with competitor numbers.
Ranking list of single or added runs (same as with NET TIME mode).

PARALLEL DIFFERENTIAL

Time difference at the finish on parallel race courses.
Penalty and list of runs.

TRAINING

Start with two intermediate and finish times (automatic numbering).
Run ranking and listing for each competitor in different runs.

SPLIT

Split times, partial times or lap times with competitor numbering. Ranking or listing of a competitor's lap times

SPLIT / LAP

Split Times with competitor numbering

5.2. Parameters

5.2.1. Precision

The timing PRECISION (can be selected at start up, or assigned by default) refers to the race results
Two calculation modes are available:

«NET TIME» calculation		«REAL TIME» calculation	
Ex : with a result to 1/100 sec		Ex : with a result to 1/1000 sec	
Start Time N°121	12:34:56.136	Start Time N°121	12:34:56.136
Finish Time N°121	12:35:59.354	Finish Time N°121	12:35:59.354
Result	1:03.21	Result	1:03.218
The last digit of the calculation is truncated.			

Timing Modes	
With truncation	**Without truncation**
NET TIMES	PTB SEQUENTIAL
NET TIMES + 2 INTER	PARALLEL DIFFERENTIAL
PARALLEL SEQUENTIAL	START – FINISH
TRAINING	START – FINISH + 2 INTER
	SPLIT
	SPLIT / LAP
Results by default are 1/100 sec	Results by default are 1/1'000 sec
Selectable timing resolution from 1 sec to the 1/10'000 sec	Selectable timing resolution from 1 sec to 1/100'000 sec.

ATTENTION!

The RS232 and Ethernet ports always communicate the time of day to the PC with the same timing resolution as given on the CP 540's printer.
This avoids calculation and results errors often observed if you compare the results given by the timing device to the software running on your PC.

5.2.2. Lock Time (multiple impulse filtering)

Lock-out time of the 4 inputs is selectable from 0.01 to 9.99 seconds.
To enter 1.00 sec, press 1 – 0 – 0 and validate with ◄┘.
The minimum lock-out time of 0.01 sec should not be used with any mechanical triggering device (bounce may cause several impulses received).

ATTENTION

For your convenience, default lock times are pre-programmed for each timing mode, and can be modified by you.

.

5.2.3. Numbering (except PTB SEQ)

Manual or Automatic competitor numbering assigned to any of the 4 inputs.
Automatic: in ascending UP order or in reference to a previous run ranking order (or BIBO)

Manual: enter the competitor's N° + (**E1 – E4**) normally before a timing impulse is received.

5.2.4. Inputs Status

Selection of Inputs and their timing info functions info (transmit / received)

Three statuses

↑ Transmit

— Close

↓ Received

The default status of the input is as follows (after switching off the CP 540)

↑ ↑ ↑ ↑

E1 E2 E3 E4

The inputs are reported as « Transmit »

Example :
CP 540 (A) records Starting Time
CP 540 (B) records Finish Time
Download the Start time from CP 540 (A) into the CP 540 (B) for the net time calculation and from CP 540 (B) into the CP 540 (A).
Config the Input as follow

CP 540 (A) – Start			
↑	—	—	↓
E1	**E2**	**E3**	**E4**

CP 540 (B) – Finish			
↓	—	—	↑
E1	**E2**	**E3**	**E4**

The inputs status should be specifically programmed when several CP 540 need to communicate together via RS 232 or with GSM Docking station.
Thus, each Chronoprinter will be able to receive recorded information at the Start and Finish point.

5.2.5. LCD Contrast

LCD screen Backlight adjustment with ▲ plus / ▼ less, and validate with ◄┘ (30% is the default setting)

5.2.6. LCD Backlight

Adjusts the luminosity of LCD Backlight.
100% is the default setting (with an external power supply connected)
30% is the default setting (when running only on internal batteries)
It is recommended to set the value at 0% during daylight conditions to guarantee the best internal battery life.

5.2.7. LCD Delay

LCD duration of the currently displayed information. Adjust with ▲ Plus / ▼ Less, then validate ◄┘
(5 seconds is the default setting)

5.2.8. Beep

Audio signal activation (ON or OFF).
Default setting is: ON

5.2.9. **RS232** (PC)

To PC with selectable serial Port:
Baud rate is selectable: 2'400 / 9'600 / 38'400 / 57'600.
9'600 Bds is the default setting.

To Display

- Running Time on the **TAG Heuer** display (HL960 / HL990 / HL965 / HL980 with converter for the HL 970) and other display as Alge.
- Running Time of Day of the CP 540
- Blank command to the Display

Running time is the default setting
Display Duration of net times is adjustable from 1 to 59 seconds using the ▲ Plus / ▼ Less arrows, then validate with ◄┘ (10 seconds is the default setting).

5.2.10. Ethernet

Activation ON or OFF.

NOTE:
The Ethernet communication port has continuous power consumption, and therefore is OFF by default. It must be turned ON each time you power up the Chronoprinter.

5.2.11. Language

The CP 540 is programmed in English and French.
German and Italian languages are available for download from our website
www.tagheuer-timing.com

5.3. Speed

Selectable Speed unit of measurement is m/s, **Km/h**, Miles/h and Knots. Four different speed measurements can be configured between the 4 inputs.
Ex: for Speed 1 between inputs 2 and 3 at a distance of 10 meters:

Start	Press 2, and validate ◄┘
Stop	Press3, and validate ◄┘
Distance	To input the distance between the photocells in millimetres: Press 10'000 and validate ◄┘.

Use ✱ to correct any input error. Re-enter the input correctly then validate ◄┘
When finished (for instance, if only one speed trap is to be configured) simply press **F**.

PLEASE NOTE

Speed measurements are possible in all the timing modes above, with the exception of PARALLEL DIFFERENTIAL

5.4. Printer

Printer may be ON or OFF.
To guarantee the best printing autonomy, the speed of the printer is electronically controlled based on the voltage of the batteries.
If the voltage decreases, the printing speed will slow down.
If the batteries fall below a certain voltage threshold, the printer will automatically stop. The running Time of Day on the LCD will flash.
To restore the printer, connect an external power supply and then turn the printer ON again from the menu **F**.
If an external power supply is connected when you turn ON the CP 540, the printer will be automatically ON.

5.5. Download

- To PC: downloads of all times memorized in one run or in all runs through the RS232 port.
- To Printer: reprint all times memorized in one run or in all runs.
Be sure your batteries are fresh (if not connected to the external power supply) and that there is adequate paper, especially if you will be printing many times.

Press * to stop the printing at any time.

6. Keyboard shortcuts

These important functions will help you during your timing sessions. They are similar for most of the timing modes **except PTB SEQUENTIAL.**

Pay close attention to these shortcuts and to the **RECALL** function. They allow you to act quickly in case of errors or unexpected situations.

N° + E1	To input or to change a competitor N° before a Start, or before a Start in **Parallel SEQ** on the blue course, or before a Finish in **Parallel DIFF** on the blue course.
N° + E2	To input or to change a competitor N° before the 1st intermediate, or before a finish in **Parallel SEQ** on the blue course.
N° + E3	To input or to change a competitor N° before the 2nd intermediate, or before a finish in **Parallel SEQ** on the red course.
N° + E4	To input or to change a competitor N° before the finish, or before the Start in **Parallel SEQ** on the red course, or before the finish in **Parallel DIFF** on the red course
***** + **N °** + **E1**	**Forunners** numbering at the Start (time calculate but not ranked)
(**E1** – **E4**)	To un-identify a competitor already started, passed at an intermediate point or finished (false Start, false Intermediate, false Finish). The un-indentified (unassigned) times can be recalled with **RECALL**. (Ex: **R** + **E4** for the finish time) for re-identification with a competitor N° or with **0** (zero) to cancel them (**C**).
***** + (**E1** – **E4**)	To restore the previous situation (UNDO) if one or several un-assignments were made by error.
▼ + (**E1** – **E4**)	To disable auto numbering at Start, intermediate or finish. Start times, intermediate or finish times are then memorized without competitor N°. The unassigned times can be recalled with **RECALL** for re-identification.
R + (**E1** – **E4**)	**RECALL** function to recall all memorized times that are unassigned or not identified, for identification with a competitor N° or with **0** to cancel (**C**).
N° + **R** + (**E1** – **E4**)	Recall of a competitor N° to be modified a cancelled. The time of a competitor N° can then be modified or unassigned. Recall the time for a new identification, or to cancel it with **0**.
▼ + **R** + (**E1** – **E4**)	To disable auto numbering and direct access to **RECALL** for an immediate identification of the unassigned times received.
F + **◄┘**	Ranking of a single run, or of the addition of two or more runs.
N° + **R** + **0**	**To abort** a competitor N° (DNF) Quick action to cancel the start time of a competitor (**C**). **Warning:** The cancelled times (**C**) with N° + **R** + **0** are memorized but can't be recalled. If you made a mistake, it's necessary to insert the missing Time of Days manually (via menu)
N° + **R** + **0**.	**To disqualify** a competitor N° (DSQ). Quick action to cancel both the start and the finish times of a competitor **Note:** Normally a disqualification is the function of a race jury. However, use this function if no race jury exists and you desire to remove the athlete from the ranking due to disqualification.

IMPORTANT

The CP 540 will accept multiple times of the same competitor N° at the start and at the finish. The times taken into account in the ranking are the last one's recorded.
With each new start or finish, the proceeding times are automatically unassigned. It's strongly recommended to identify or to cancel these times as soon as possible. This action will simplify your timekeeping.

NOTE

This does not apply in the **TRAINING MODE**, whereby several runs for a competitor can be memorised for later analysis.

7. Special characters memorized, printed and sent to the PC

–	When a time is unassigned (false start, inter or finish)
*****	Any time modified through a manipulation of start number
+	Any time inserted manually through INSERT TIME (Menu)
=	Any time repeated through DUPLICATE (Menu)
C	Any time cancelled through N° + R + 0 or after a DNF or DSQ
#	Any Start or Finish time of a forerunner (* + N°)

8. Special function: RESET CP 540

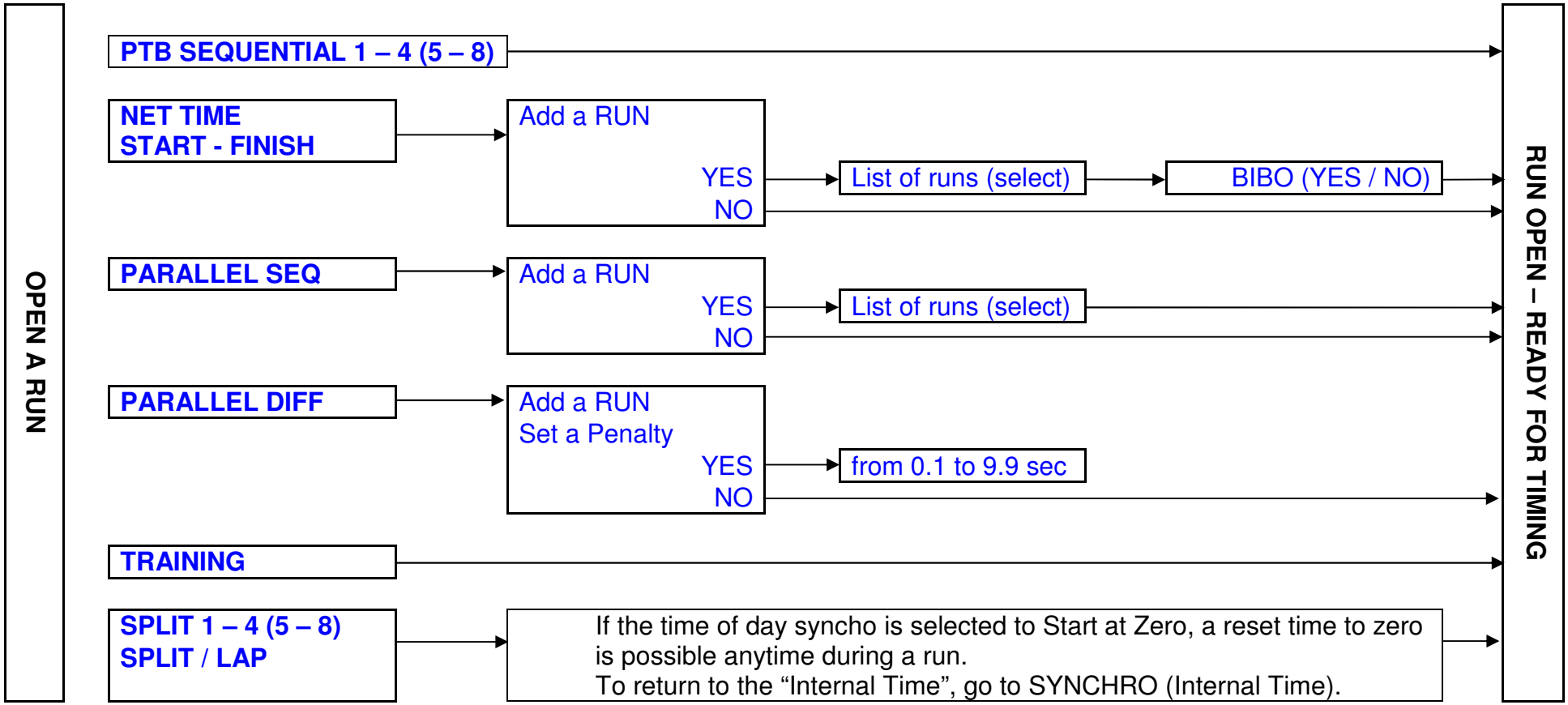
A general **RESET** can be achieved by pushing the mini switch located below the battery cover **RESET**.

For this operation use a small unfolded paper clip or a needle.

WARNING

After a RESET, the memory is cleared and all parameters are restored.
To achieve a **RESET**, the CP 540 batteries should have a good life or alternatively connect the external power supply. The **RESET** is available with CP 540 **ON** or **OFF.**

9. To open a new run (added or not to a previous run)



9.1. Addition of runs

Before to close a run, be sure that the results are correct. It is **not possible** to make further modifications after a run is closed.
If you want to add a previous run to the new one, select your choice in the menu List of Runs. After that, the CP 540 will ask you “Activate BIBO?” in the **NET TIME START – FINISH** Modes.
It is also possible to combine 2 runs already closed.
Select **Rank a run**, one of the run you want to add.

9.2. BIBO rule

BIBO is a very familiar feature in Alpine Ski racing.
It refers to the establishment of a reverse running order of a certain number finishers from the results of a proceeding run. The input of a BIBO value as required. Most FIS and USSA events use “flip 30”. In other words, the top 30 finishers from the first run will run in reverse order in the second run.
Ex: If you flip the 1st 30 competitors, the start order will refer to the competitor ranked from the 30th position to the 1st and then to the 31st and up.

If **BIBO** is not activated, the starting order will refer to the ranking of the proceeding run.

PLEASE NOTE

If several competitors are ranked with the same time (tie) at the 30th position in the proceeding run, BIBO will take in account these entire competitors N°'s.

9.3. Ranking (F + ◄┘)

General ranking of the actual run.

9.4. Rank a Run

Ranking of the actual run or proceeding runs.

10. The existing menus when a run is opened

	PTB SEQUENTIAL	NET TIME	NET TIME + 2 INTER	PARALLEL SEQ	PARALLEL DIFF	START – FINISH	START – FINISH + INTER	TRAINING	SPLIT	SPLIT / LAP
⇒ Close Run	●	●	●	●	●	●	●	●	●	●
⇒ Ranking		●	●	●	●	●	●	●		●
⇒ Rank a run		●	●	●	●	●	●	●		●
⇒ Still on Course		●	●	●		●	●	●		
⇒ Listing								●		●
⇒ Lister a Run								●		●
⇒ Duplicate		●	●	●	●	●	●			
⇒ Insert Time	●	●	●	●	●	●	●	●	●	●
⇒ Speed	●	●	●	●		●	●	●		●
⇒ Parameters	●	●	●	●	●	●	●	●	●	●
⇒ Printer	●	●	●	●	●	●	●	●	●	●
⇒ Merge a run *		●	●			●	●			
⇒ Download	●	●	●	●	●	●	●	●	●	●

Copy all times from the Run selected into a new run

11. Description of the menu (when a run is open)

⇨ **Close a Run**	Before you close a run, be sure to have all possible modifications done.
⇨ **Ranking**	Ranking of the actual run (if only one or General Ranking of combined runs).
⇨ **Rank a Run**	Ranking of any memorized run or of the actual run if added with another (►). Available for Training and Split / Lap modes
⇨ **Listing**	Listing of a competitor's number in a chronological order for the actual run (all the memorized times for a competitor). Available for Training and Split / Lap modes.
⇨ **List a run**	Listing of a competitor's number in a chronological order of any run.
⇨ **Still on Course**	The competitor still on the course (net yet arrived)
⇨ **Duplicate**	Allows another or several competitor N°'s to be associated with a particular start, intermediate or finish time already received. Same function exists for mass starts or group starts.
⇨ **Insert Time**	Allows you to create a particular start of finish Time of Day for any competitor.
⇨ **Speed**	Refer to the main menu.
⇨ **Parameters**	Refer to the main menu. When a run is opened, you don't have set Syncho, Time and Date. Depending on which Timing Mode you select, some parameters are not active.
⇨ **Printer**	ON or OFF. Refer to the main menu.
⇨ **Merge a run**	Import all times from the selected run into the new run opened.
⇨ **Download**	to PC or Printer. Refer to the main menu.

WARNING

Please refer you to the chapter 5.2.5 (Inputs Status) to setup the received CP 540 from another CP 540.

11.1. Mass Start or Group Start (GRP)

The start time could be provided by a timing impulse or at a pre defined time

11.1.1. Start with a timing impulse

(The impulse is provided by a start gate, a photocell or a manual contactor on Input 1)

- Select NET TIME (menu – Timing Modes)
- Open a New Run
- Input a competitor N° at the start (N° + E1), N°1 in our example.
- Give the start by an impulse on INPUT 1 (manual or external)
- Select Duplicate (menu)
- Input the N° to be duplicated (N°1 in our example)
- The N° and the start time are displayed
- Duplicate one or several competitor N° started at the same time as N°1
- **►Other N° _ _ _ _** : if the competitor N° are not in chronological order (ex 2, 5, 9 etc)
- **► N° From _ _ _ _ to _ _ _ _**: if the competitor N° are in a chronological order (eg from 2 to 10)

> **WARNING**
>
> If you input a lot of competitor numbers in the same group (eg 1 to 150), it could take several seconds to proceed to the memorisation.

11.1.2. Start a defined time

The start(s) time(s) must be programmed in the CP 540 after you open a New Run.

- Select NET TIME (menu – Timing Modes)
- Open a New Run
- Select - Insert Time and E1 (Menu)
- Input a competitor N° (eg N°1) and then the start defined time (ex: 12:34:00.000)
- If one or more competitor numbers are starting at the same time, select Duplicate and follow the steps as described above.

> **WARNING**
>
> The defined start times must be referenced with the time-of-day of your CP540 (Synchro).

12. Changing the paper roll

It is best to change the paper roll before the existing roll is about to run out. A red border on the paper indicates that the paper is about to run out.

The change can also be carried out during the timing session (even in emergency when there is no more paper) thanks to the fact that all times are memorized while the replacement is going on. The memorized time will be printed on the new paper roll.

⇒ **Before the end of the paper** Enter the MENU, select **PRINTER** then **OFF** (Printer disabled).
As soon as the change is carried out, don't forget to turn the **PRINTER** back to **ON**.

⇒ **When there is no more paper** The printer is automatically switched OFF.
It will print again automatically as soon as the new paper roll is in place. All times are recorded even if the Printer is OFF.
We recommend you check the status of your paper roll before the start of a race, and replace it with a fresh roll if it is about to run out!

Open the paper compartment:

To open the paper compartment, use your thumbs to slide it toward the back of the device.
To slide it back into, place, put the cover flat about 3-4mm behind its closing position.

PLEASE NOTE

The paper roll is firmly supported by two lateral "half-moons" to prevent it from moving or unwinding itself.

To remove a finished paper roll:

Pull from the centre of the paper roll backwards to extract it (as well as the paper that is still engaged in the printer).

To insert a new paper roll:

- Unroll a few centimetres of paper until its surface is clean. Cut it in a clean, perpendicular fashion.
- Put the paper roll into the cradle. Insert the paper edge under the cylindrical driver bar. Maintain a light pressure on the paper while pressing the paper feed button (↑). Make sure the paper is going in straight. Place the paper roll in its compartment and push it downwards. You will feel a click as soon as the paper roll has found its housing.

To extract a paper roll partially started:

- Rotate the paper roll to loosen a little bit of the paper.
- Extract 3 to 4 cm of paper.
- Firmly hold the unrolled paper with your index finger and thumb on each side and pull it vertically out.

13. Autonomy / Batteries

Use good quality alkaline AA batteries for best results.
The chart below assumes timing impulses and printing happening every 6 seconds. The CP 540 is delivered with Energizer batteries.

	0°C / (32°F)	**20C° / (68°F)**
Energizer – Alkaline (AA) 1.5V	2'500	11'000

Use in low temperatures

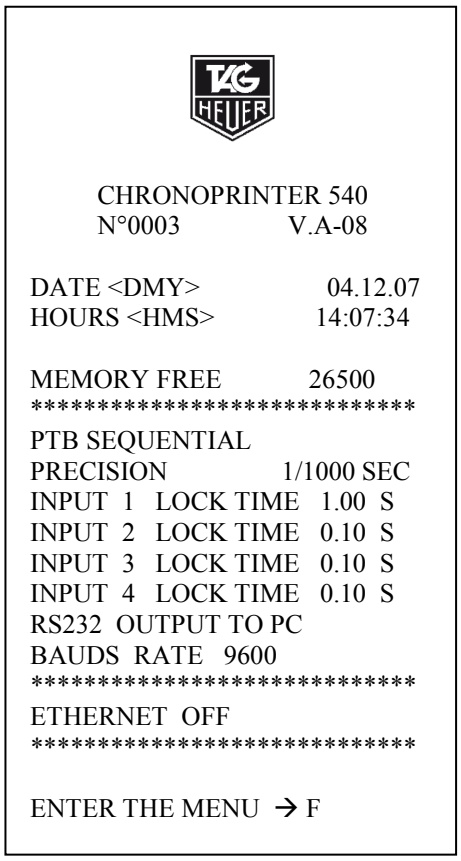
The CP 540 is able to print on temperatures as low as -25°C!
Whenever possible, use the external power supply to extend battery life.
We recommend you consider purchasing one of the Docking Station for extended autonomy in situations when AC power is unavailable.
The autonomy of the Docking BATT will allow you to print 30'000 times at 20°C and at least 10'000 times at -20°C (GPS = OFF and LCD back light at 0)

WARNING

Pay attention to the autonomy of the batteries and of the paper roll if you have to print any times
It is recommended to set the back light of the LCD at 0 for a longer autonomy.

14. Information about Timing Modes

Each Timing Mode has parameters that are memorized (default) based on those given during the last timing session.



CHRONOPRINTER 540
N°0003 V.A-08

DATE <DMY> 04.12.07
HOURS <HMS> 14:07:34

MEMORY FREE 26500
****
PTB SEQUENTIAL
PRECISION 1/1000 SEC
INPUT 1 LOCK TIME 1.00 S
INPUT 2 LOCK TIME 0.10 S
INPUT 3 LOCK TIME 0.10 S
INPUT 4 LOCK TIME 0.10 S
RS232 OUTPUT TO PC
BAUDS RATE 9600
****
ETHERNET OFF
****

ENTER THE MENU → F

Each Timing Mode proposes the main parameters memorized by default or used during the last timing session.

Example:
PTB SEQUENTIAL Mode

PTB SEQUENTIAL

- 4 active inputs with sequential numbering of time for each input

NET TIME

- Start on input 1
- Finish on input 4
- Inputs 2 and 3 are not using
- Automatic numbering on Start and Finish.
- Calculation mode **with truncation**

NET TIME + 2 INTER

- Start on input 1
- Intermediate and/or speed on Inputs 2 and 3
- Finish on input 4
- Automatic numbering on start and finish
  Intermediate times with manual numbering by default
- Calculation mode **with truncation**

PARALLEL SEQUENTIAL

- Blue course start on input 1
- Blue course finish on input 2
- Red course start on input 4
- Red course finish on input 3
- Manual numbering for the start, and automatic number for the finish

PARALLEL DIFFERENTIAL

- Blue course finish on input 1
- Red course finish on input 4
- Inputs 2 and 3 are not used
- Penalty or time difference needs to be entered for each run.
- Manual numbering for finish

START – FINISH

- Start on input 1
- Finish on input 4
- Inputs 2 and 3 are not used
- Automatic numbering on start and finish.

START – INTER – FINISH

- Start on input 1
- Intermediate and/or speed on inputs 2 and 3
- Finish on input 4
- Automatic numbering on start and finish
  Intermediate times with manual numbering by default

TRAINING

- Start on input 1
- 1st intermediate on input 2
- 2nd intermediate on input 3
- Finish on input 4
- Automatic numbering on start, intermediates and finish

SPLIT

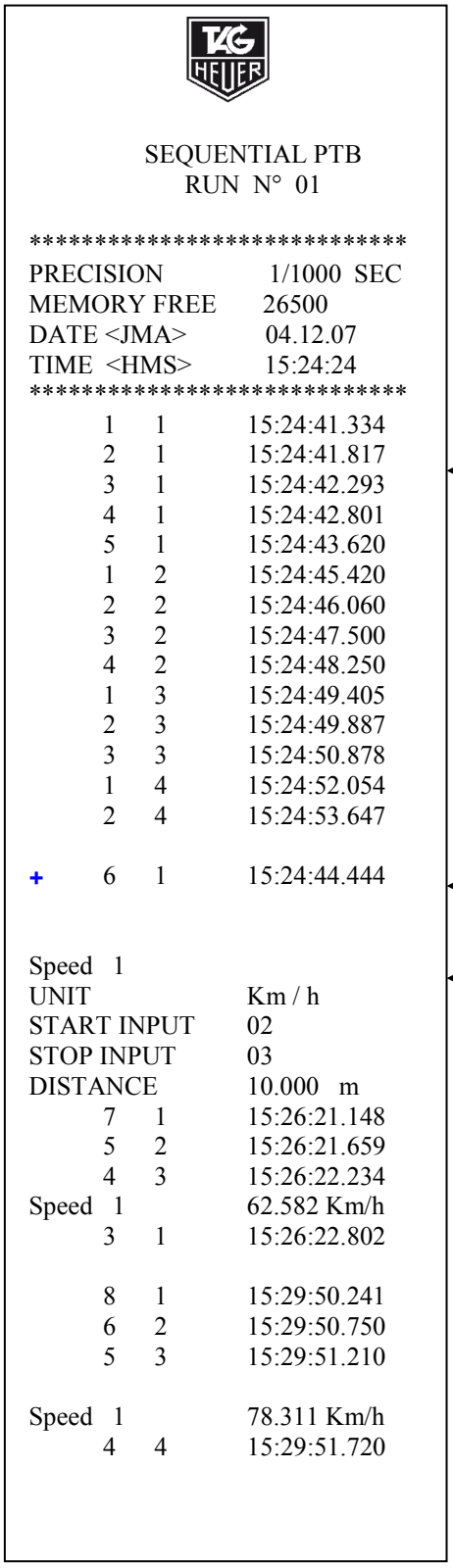
- 4 active inputs with competitor numbering
- Manual numbering (by default)
- Sequential N°s for each input are sent to PC

SPLIT / LAP

- 4 active inputs with automatic (ascending) competitor N°.
- This mode allows independent timing of 4 competitors using 4 inputs.

15. Example of Timekeeping sessions

15.1. SEQUENTIAL Mode



```
          SEQUENTIAL PTB
          RUN  N°  01

*****************************
PRECISION            1/1000  SEC
MEMORY FREE          26500
DATE <JMA>           04.12.07
TIME  <HMS>          15:24:24
*****************************
        1    1       15:24:41.334
        2    1       15:24:41.817
        3    1       15:24:42.293
        4    1       15:24:42.801
        5    1       15:24:43.620
        1    2       15:24:45.420
        2    2       15:24:46.060
        3    2       15:24:47.500
        4    2       15:24:48.250
        1    3       15:24:49.405
        2    3       15:24:49.887
        3    3       15:24:50.878
        1    4       15:24:52.054
        2    4       15:24:53.647

+       6    1       15:24:44.444


Speed   1
UNIT                 Km / h
START INPUT          02
STOP INPUT           03
DISTANCE             10.000   m
        7    1       15:26:21.148
        5    2       15:26:21.659
        4    3       15:26:22.234
Speed   1            62.582 Km/h
        3    1       15:26:22.802

        8    1       15:29:50.241
        6    2       15:29:50.750
        5    3       15:29:51.210

Speed   1            78.311 Km/h
        4    4       15:29:51.720
```

Sequential recording of time-of-Day, independent on each channel.

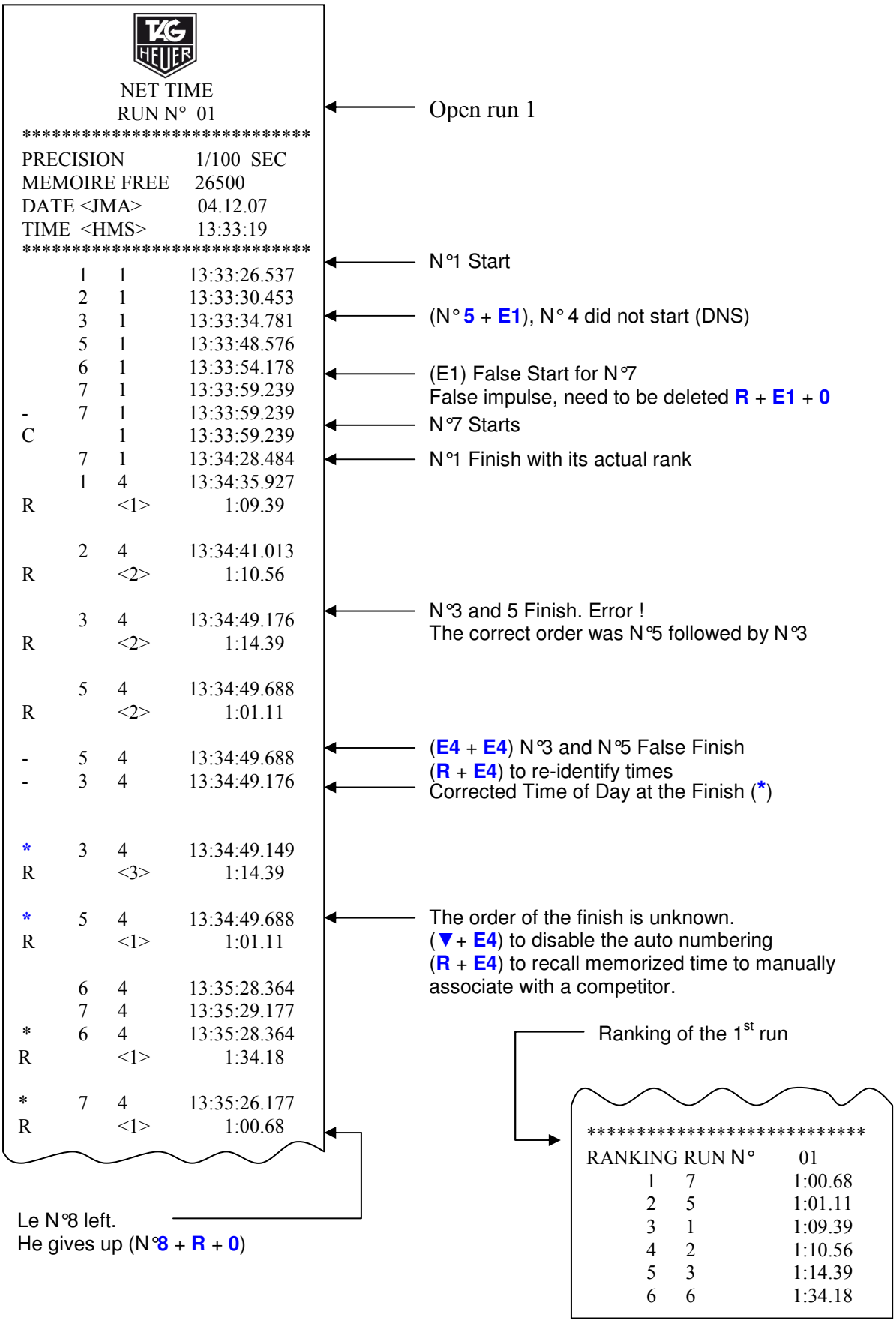
Manual time insertion on channel 1 (+)

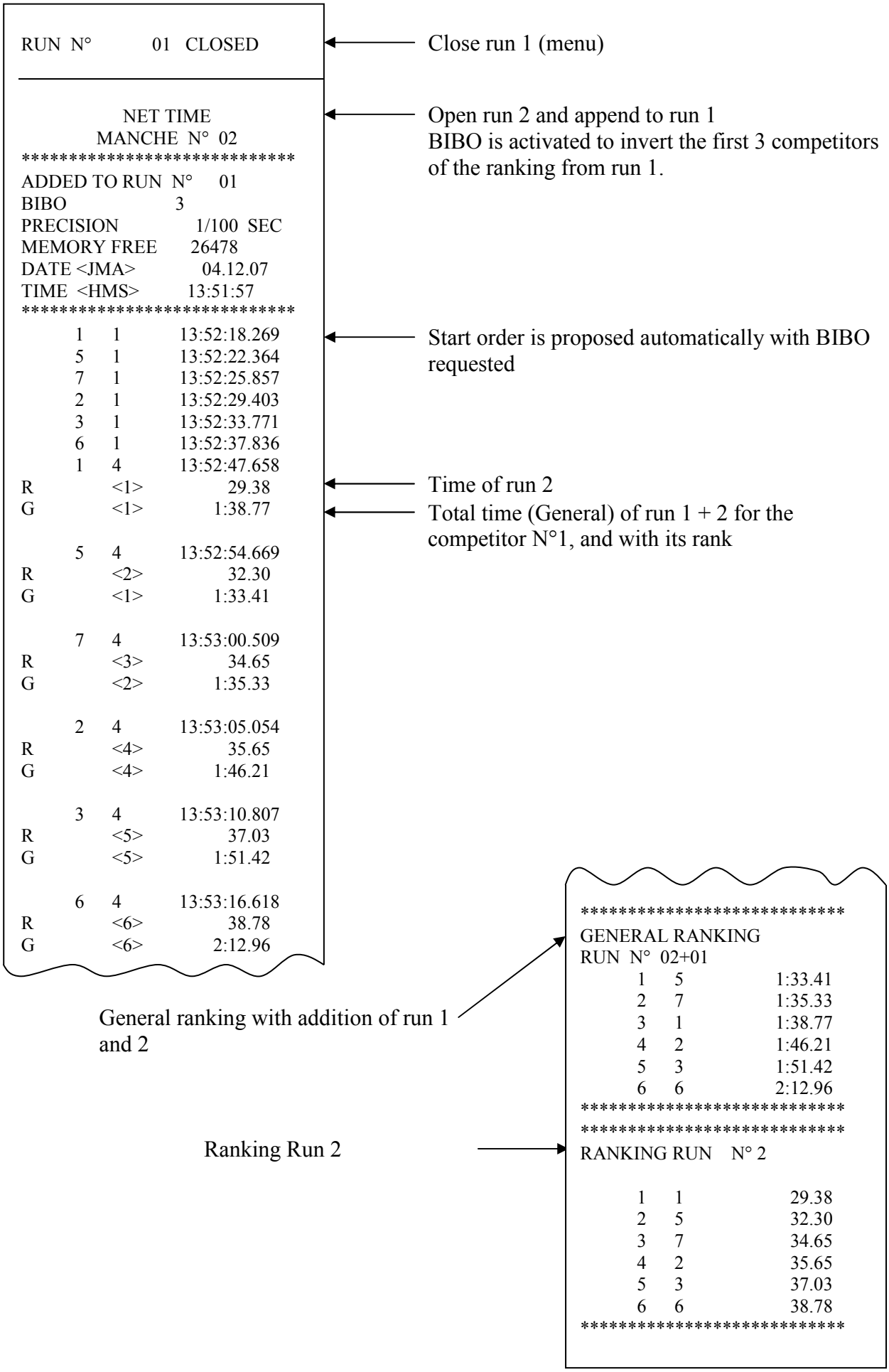
Speed measurement setting between Input 2 and 3 with a distance of 10 metres

Speed is calculated with to a precision of 1/1'600'000 of seconds !!

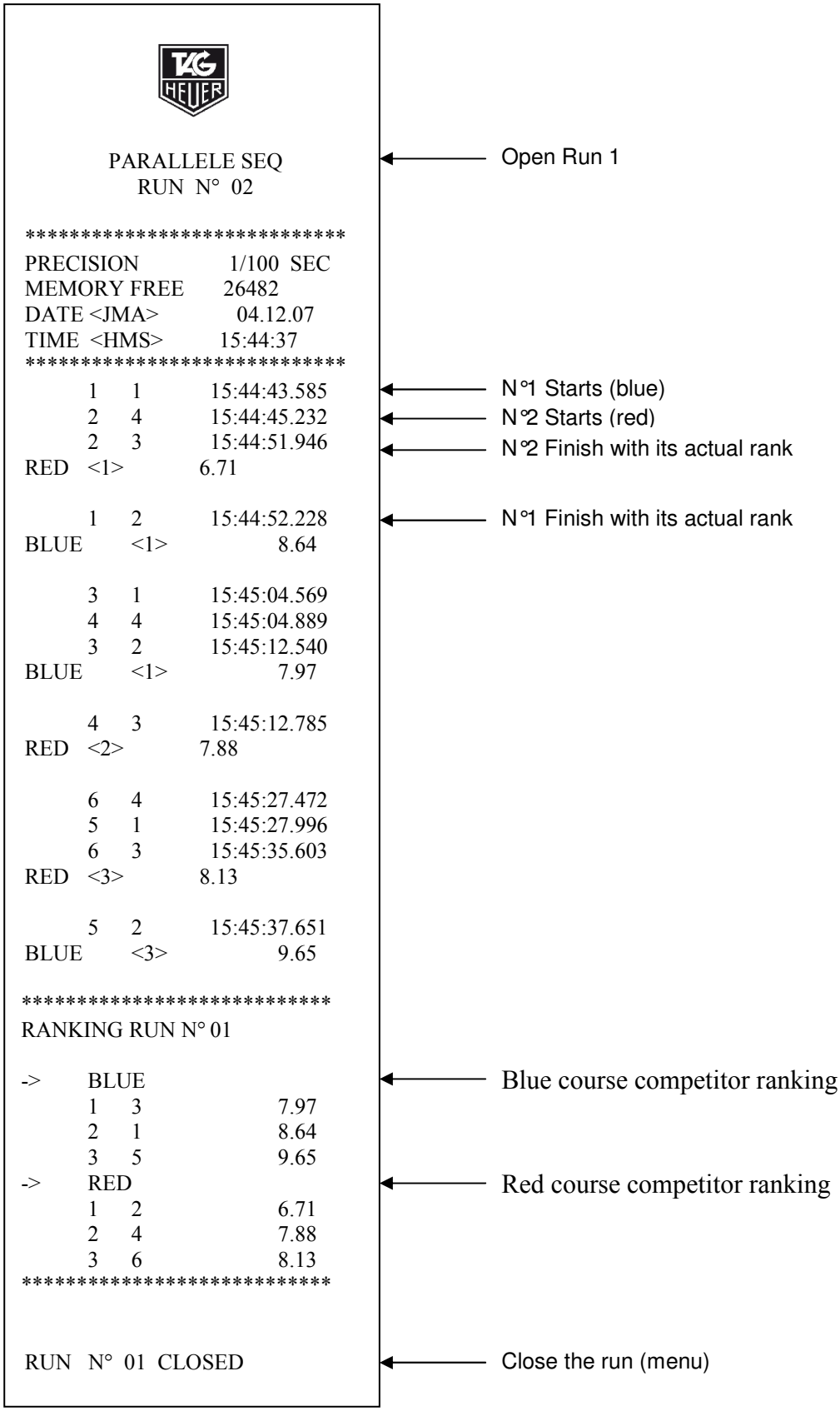
4 speeds are set in the PTB, NET TIME, START-FINISH, TRAINING and SPLIT mode
1 speed by course track in PARALLEL SEQ.

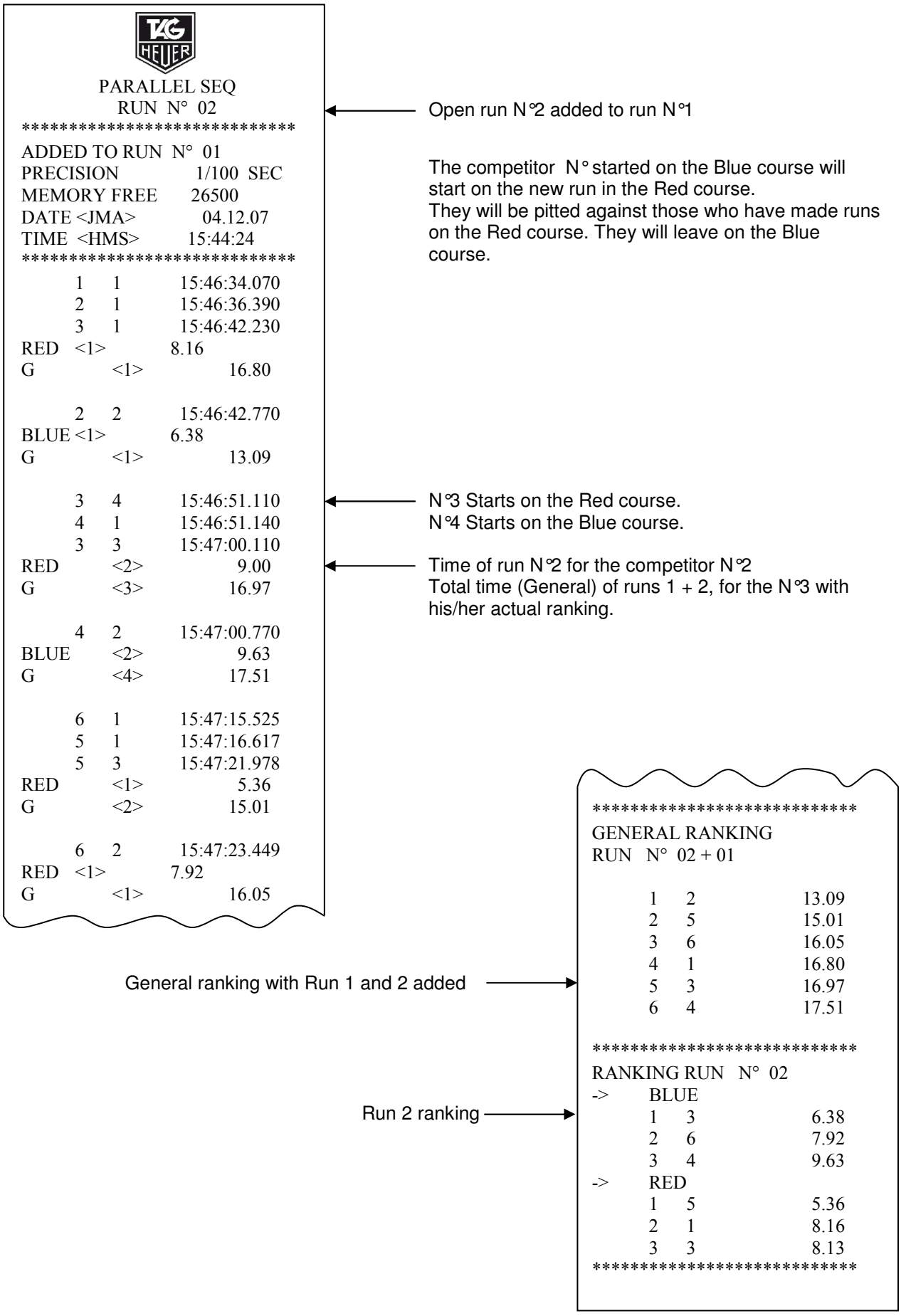
15.2. NET TIME Mode



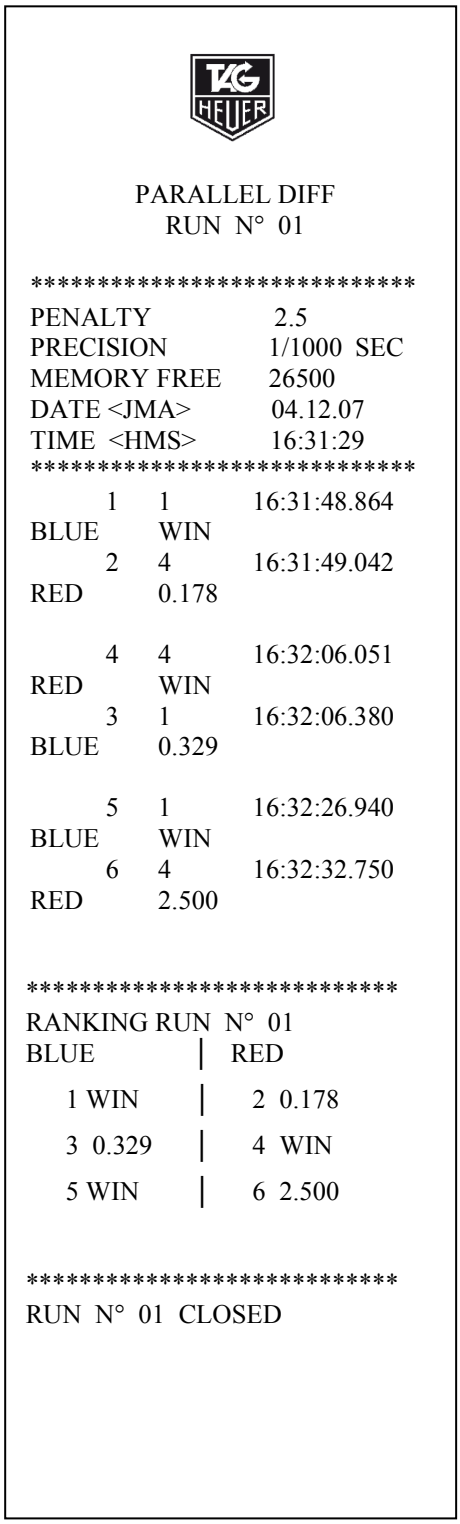

RUN N° 01 CLOSED
Close run 1 (menu)
NET TIME
MANCHE N° 02
****
ADDED TO RUN N° 01
BIBO 3
PRECISION 1/100 SEC
MEMORY FREE 26478
DATE <JMA> 04.12.07
TIME <HMS> 13:51:57
****
Open run 2 and append to run 1
BIBO is activated to invert the first 3 competitors of the ranking from run 1.
1 1 13:52:18.269
5 1 13:52:22.364
7 1 13:52:25.857
2 1 13:52:29.403
3 1 13:52:33.771
6 1 13:52:37.836
1 4 13:52:47.658
Start order is proposed automatically with BIBO requested
R <1> 29.38
G <1> 1:38.77
Time of run 2
Total time (General) of run 1 + 2 for the competitor N°1, and with its rank
5 4 13:52:54.669
R <2> 32.30
G <1> 1:33.41
7 4 13:53:00.509
R <3> 34.65
G <2> 1:35.33
2 4 13:53:05.054
R <4> 35.65
G <4> 1:46.21
3 4 13:53:10.807
R <5> 37.03
G <5> 1:51.42
6 4 13:53:16.618
R <6> 38.78
G <6> 2:12.96
General ranking with addition of run 1 and 2
****
GENERAL RANKING
RUN N° 02+01
1 5 1:33.41
2 7 1:35.33
3 1 1:38.77
4 2 1:46.21
5 3 1:51.42
6 6 2:12.96
****
****
RANKING RUN N° 2
Ranking Run 2
1 1 29.38
2 5 32.30
3 7 34.65
4 2 35.65
5 3 37.03
6 6 38.78
****

15.3. PARALLEL SEQUENTIAL Mode




PARALLEL SEQ
RUN N° 02
****
ADDED TO RUN N° 01
PRECISION 1/100 SEC
MEMORY FREE 26500
DATE <JMA> 04.12.07
TIME <HMS> 15:44:24
****
1 1 15:46:34.070
2 1 15:46:36.390
3 1 15:46:42.230
RED <1> 8.16
G <1> 16.80
2 2 15:46:42.770
BLUE <1> 6.38
G <1> 13.09
3 4 15:46:51.110
4 1 15:46:51.140
3 3 15:47:00.110
RED <2> 9.00
G <3> 16.97
4 2 15:47:00.770
BLUE <2> 9.63
G <4> 17.51
6 1 15:47:15.525
5 1 15:47:16.617
5 3 15:47:21.978
RED <1> 5.36
G <2> 15.01
6 2 15:47:23.449
RED <1> 7.92
G <1> 16.05
Open run N°2 added to run N°1
The competitor N° started on the Blue course will start on the new run in the Red course.
They will be pitted against those who have made runs on the Red course. They will leave on the Blue course.
N°3 Starts on the Red course.
N°4 Starts on the Blue course.
Time of run N°2 for the competitor N°2
Total time (General) of runs 1 + 2, for the N°3 with his/her actual ranking.
General ranking with Run 1 and 2 added
Run 2 ranking
****
GENERAL RANKING
RUN N° 02 + 01
1 2 13.09
2 5 15.01
3 6 16.05
4 1 16.80
5 3 16.97
6 4 17.51
****
RANKING RUN N° 02
-> BLUE
1 3 6.38
2 6 7.92
3 4 9.63
-> RED
1 5 5.36
2 1 8.16
3 3 8.13
****

15.4. PARALLEL DIFFERENTIAL Mode



PARALLEL DIFF
RUN N° 01

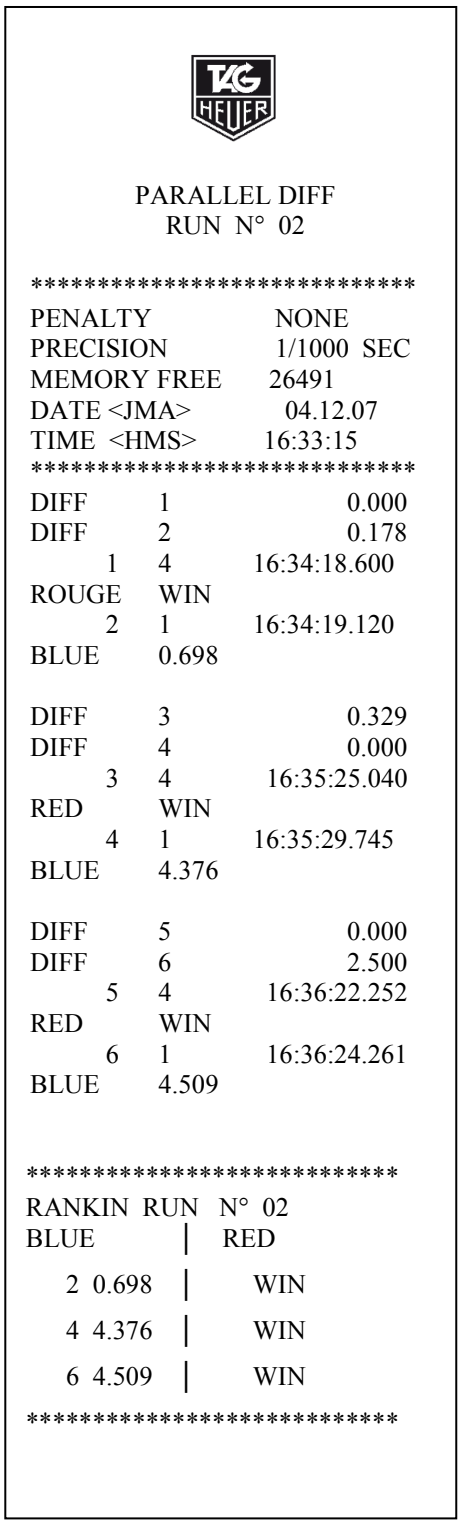
****
PENALTY 2.5
PRECISION 1/1000 SEC
MEMORY FREE 26500
DATE <JMA> 04.12.07
TIME <HMS> 16:31:29
****

1	1	16:31:48.864
BLUE	WIN	
2	4	16:31:49.042
RED	0.178	
4	4	16:32:06.051
RED	WIN	
3	1	16:32:06.380
BLUE	0.329	
5	1	16:32:26.940
BLUE	WIN	
6	4	16:32:32.750
RED	2.500	

****
RANKING RUN N° 01

BLUE	RED
1 WIN	2 0.178
3 0.329	4 WIN
5 WIN	6 2.500

****
RUN N° 01 CLOSED



PARALLEL DIFF
RUN N° 02

****
PENALTY NONE
PRECISION 1/1000 SEC
MEMORY FREE 26491
DATE <JMA> 04.12.07
TIME <HMS> 16:33:15
****

DIFF	1	0.000
DIFF	2	0.178
1	4	16:34:18.600
ROUGE	WIN	
2	1	16:34:19.120
BLUE	0.698	
DIFF	3	0.329
DIFF	4	0.000
3	4	16:35:25.040
RED	WIN	
4	1	16:35:29.745
BLUE	4.376	
DIFF	5	0.000
DIFF	6	2.500
5	4	16:36:22.252
RED	WIN	
6	1	16:36:24.261
BLUE	4.509	

****
RANKIN RUN N° 02

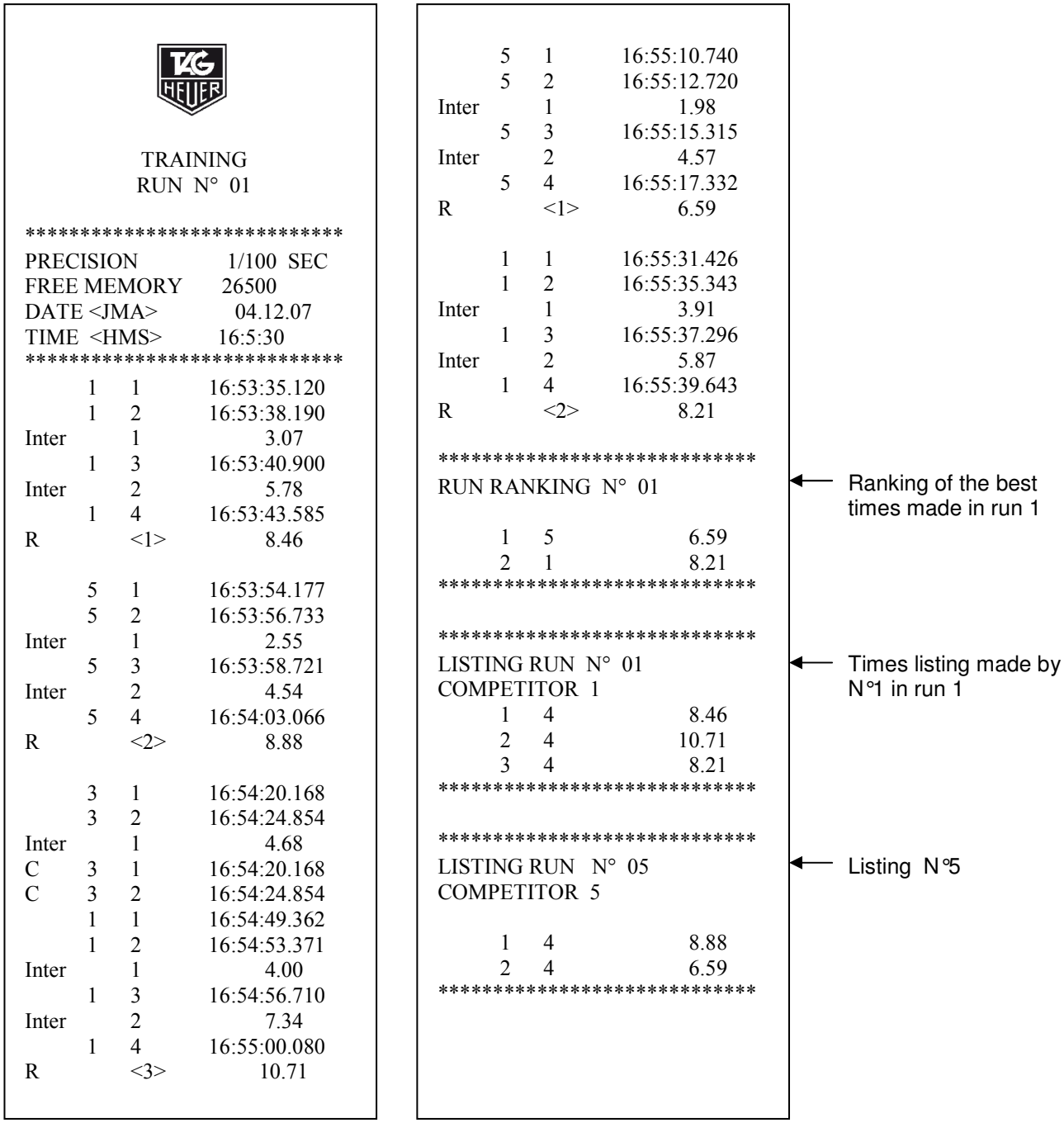
BLUE	RED
2 0.698	WIN
4 4.376	WIN
6 4.509	WIN

****

For run 1, a PENALTY of 2.5 seconds was introduced. If a competitor does not cross the finish line, it is NECESSARY to manually allocate the arrival impulse with green button 1 or 4.
The time taken is the one of the introduced penalty:

For the run 2, WITHOUT PENALTY, the differences during run 1 will be implemented for each N° competitors. 0,000 for the winner of the 1st run and 0,698 for example, for the competitor who faces the winner on the opposite track.

15.5. TRAINING Mode



TRAINING
RUN N° 01

****
PRECISION 1/100 SEC
FREE MEMORY 26500
DATE <JMA> 04.12.07
TIME <HMS> 16:5:30
****

	1	1	16:53:35.120
	1	2	16:53:38.190
Inter		1	3.07
	1	3	16:53:40.900
Inter		2	5.78
	1	4	16:53:43.585
R		<1>	8.46
	5	1	16:53:54.177
	5	2	16:53:56.733
Inter		1	2.55
	5	3	16:53:58.721
Inter		2	4.54
	5	4	16:54:03.066
R		<2>	8.88
	3	1	16:54:20.168
	3	2	16:54:24.854
Inter		1	4.68
C	3	1	16:54:20.168
C	3	2	16:54:24.854
	1	1	16:54:49.362
	1	2	16:54:53.371
Inter		1	4.00
	1	3	16:54:56.710
Inter		2	7.34
	1	4	16:55:00.080
R		<3>	10.71
	5	1	16:55:10.740
	5	2	16:55:12.720
Inter		1	1.98
	5	3	16:55:15.315
Inter		2	4.57
	5	4	16:55:17.332
R		<1>	6.59
	1	1	16:55:31.426
	1	2	16:55:35.343
Inter		1	3.91
	1	3	16:55:37.296
Inter		2	5.87
	1	4	16:55:39.643
R		<2>	8.21

****
RUN RANKING N° 01

1	5	6.59
2	1	8.21

****

****
LISTING RUN N° 01
COMPETITOR 1

1	4	8.46
2	4	10.71
3	4	8.21

****

****
LISTING RUN N° 05
COMPETITOR 5

1	4	8.88
2	4	6.59

****

This timing mode requires a minimal amount of manual input
N° + **E1** if the competitor N° proposed on the Start is incorrect
N° + **R** + **0** if competitor aborts the run

Example:
N°3 starts and aborts the run after the 1st intermediate

16. Download a new version of Software and/or language

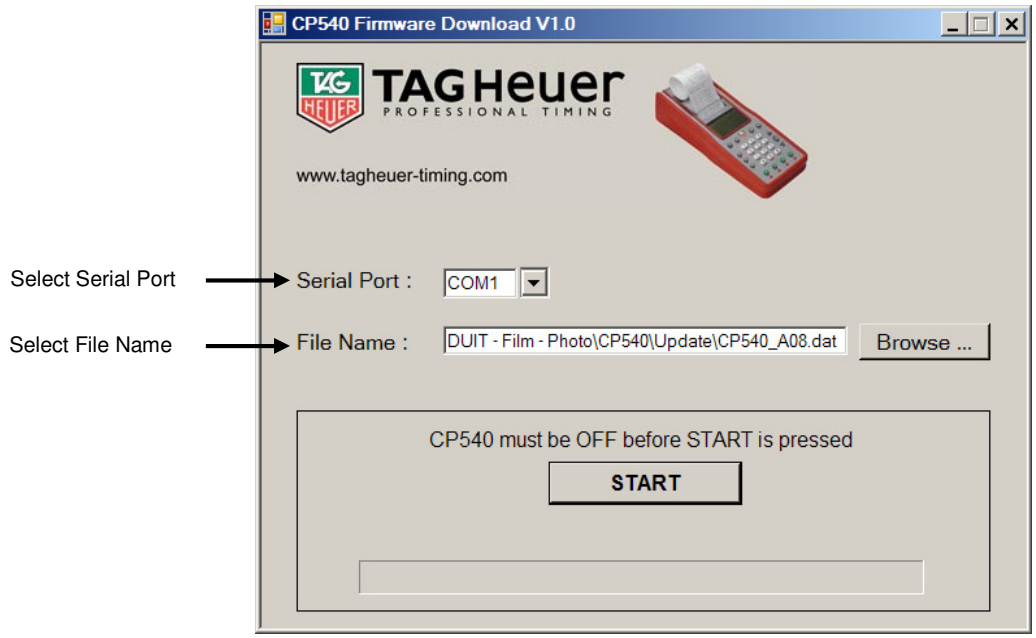
Program downloads and new releases of CP 540 software are available Free of Charge on our website www.tagheuer-timing.com

For this operation, you need to have:

- RS232 cable – (Sub-D9p/RJ11) HL540-10
- PC with output RS232 (Sub-D9p)
- The software « CP540 Firmware.exe »

Procedure

1. Copy the software «CP540 Firmware.exe » onto your hard disk
2. Power the CP 540 with an external power supply (The CP 540 is off).
3. Connect the RS232 cable (HL540-10) to the PC and the CP 540
4. Run the software « CP540 Firmware.exe »



5. Select the COM Port
6. Select the file: Update (CP540_xxx.dat)
7. Press START on the software.
8. Power ON the CP540 (press the ON button for 5 seconds)
   The CP 540 will go into a special mode « Download ».
   The LDC back light will be ON, but LCD will be blank.
9. As soon as the upgrade is downloaded into the CP 540, validate the software with OK.
10. Remove the RS232 cable from the CP 540, and switch on the CP 540 again.
11. The new software version will be printed (if the Printer is in ON)

17. RS232 and Ethernet Protocol

RS232 Port settings:

2400, 9600, 38400, 57600 bds
Data 8 bits, 1 stop bit, no parity
Frame Format: Data + TAB + CS16 + CR + LF
TAB = 0x09
CR = 0x0D
LF = 0x0A

CS16 is the sum of all data octets (is the sum of all the data bytes – except for the characters '#' if present) module 65536. The hexadecimal result is inserted in the frame with 4 ASCII characters.

Example: print the text 'Hello'

#PL Hello<TAB><CS16><CR><LF>

Data :

P = 0x50	L = 0x4C	Space = 0x20	H = 0x48	e = 0x65	l = 0x6C	l = 0x6C	o = 0x6F

Sum = 02B0 (hexadecimal) = CS16

Frame:

#	P	L		H	e	l	l	o	<TAB>	**0**	**2**	**B**	**0**	<CR>	<LF>
0x23	0x50	0x4C	0x20	0x48	0x65	0x6C	0x6C	0x6F	0x09	**0x30**	**0x32**	**0x42**	**0x30**	0x0D	0x0A

Flow control

If any equipment connected to the RS232 port does not allow a flow minimum of 2400 dbs (ex. Radio transmission), a basic flow control is available
Set into Parameter – RS232 menu, the config « 9600bds Flow Ctrl ».
Once this option is activate, the CP 540 sends the first Frame and waits to receive the characters 0x06 « ACK » before sending the next one.

Ethernet:

IP by default 192.168.001.050
Port 7000
Frame format: Data + CR + LF

CR 0x0D
LF 0x0A

Message list

CP540 to PC Frame ID's:

AK	PC command acknowledge (Every PC to CP540 message is acknowledge)
ID	CP540 Identification number
OP	Open Run
CL	Close Run
DS	Download Run Start
DE	Download Run End
TN	New Time data
T-	Unassigned Time
T*	Re-identified Time
T+	Manually Inserted Time
T=	Duplicated Time
TC	Cancelled Time
IR	Intermediate Result
DR	Differential Result
RR	Run Result
GR	Result add to another Run Result
VE	Speed
AN	Recalled or Downloaded Time: original
A-	Recalled or Downloaded Time: De-identified
A*	Recalled or Downloaded Time: Re-identified
A+	Recalled or Downloaded Time: Manually Inserted
A=	Recalled or Downloaded Time: Duplicated Time
AC	Recalled or Downloaded Time: Cancelled Time

PC to CP540 Frame ID's:

#ID	Identification number request
#PL	Print Line (24 characters)
#DL	Download Run
#RT	Recall Time
#SL	Start List
#GP	GPRS parameters
#BM	Send message to all ports (RS232, Ethernet, GSM)
#MC	Save Identification number (MAC address LSB) to Flash

CP540 to PC Frames:

Note : Into the following frame, characters '_' represent the space .

- **PC command acknowledge (AK):**
  AK_X**<TAB><CS16><CR><LF>**

  X = 'C' if command completed, 'F' if command failed or item not found

- **CP540 Identification number (ID):**
  ID_NNNNN**<TAB><CS16><CR><LF>**

  N = ID number (0 – 65535)

- **Open new Run (OP):**
  OP_RR_TAA_XXXXXXXXXXXXXXXXXX **<TAB><CS16><CR><LF>**

  R Run number (1 – 99)
  T If 'T' the added run is a combination of other run
  A Added to Run (1 – 99)

X Timing Mode (Text 19 bytes)

- **Close Run (CL):**
  CL_RR**<TAB><CS16><CR><LF>**

  R Run number (1 – 99)

- **Download Run Start (DS):**
  DS_RR_TAA_XXXXXXXXXXXXXXXXXX **<TAB><CS16><CR><LF>**

  R Run number (1 – 99)
  T If 'T' the added run is a combination of other run
  A Added to Run (1 – 99)
  X Timing Mode (Text 19 bytes)

- **Download Run End (DE):**
  DE_RR**<TAB><CS16><CR><LF>**

  R Run number (1 – 99)

- **Time data (TN, T-, T*, T+, T=, TC):**

  Tx_NNNN_SSSS_CC_HH:MM:SS.FFFFF_DDDDD**<TAB><CS16><CR><LF>**

  N Competitor number (0 – 9999)
  S Sequential number (0 – 9999)
  C Channel number (1 - 99) or if manual inputs (M1 – M4)
  H Hours (0 – 23)
  M Minutes (0 – 59)
  S Seconds (0 – 59)
  F Fraction of seconds (0 – 99999)
  D Day (0 – 32767) starting from 01.01.2000

- **Inter, Diff, Run and Added Run Result (IR, DR, RR, GR):**
  IR_I_ _ _ _NNNN_ _ _ _HH:MM:SS.FFFFF**<TAB><CS16><CR><LF>**
  RR_ZZZZ_NNNN_ _ _ _HH:MM:SS.FFFFF**<TAB><CS16><CR><LF>**
  GR_ZZZZ_NNNN_ _ _ _HH:MM:SS.FFFFF**<TAB><CS16><CR><LF>**
  DR_WWWW_LLLL_ _ _ _HH:MM:SS.FFFFF**<TAB><CS16><CR><LF>**

Z	Rank (0 – 9999)
N	Candidate number (1 – 9999)
WWWW	Winner competitor number (1 – 9999)
L	Looser competitor number (1 – 9999)
I	Intermediate number (1 - 9)
H	Hours (0 – 23)
M	Minutes (0 – 59)
S	Seconds (0 – 59)
F	Fraction of seconds (0 – 99999)

- **Speed (VE):**
  VE_I_NNNN_SSS.SSS_UUUUUUU**<TAB><CS16><CR><LF>**

I	Speed number (1 – 4)
N	Competitor number (1 – 9999)
S	Speed (0.000 – 999.999)
U	Speed unit (Text 7 bytes)

- **Recalled (#RT) or downloaded Time data (#DL) (AN, A-, A*, A+, A=, AC):**
  Ax_NNNN_SSSS_CC_HH:MM:SS.FFFFF_DDDDD**<TAB><CS16><CR><LF>**

N	Competitor number (0 – 9999)
S	Sequential number (0 – 9999)
C	Channel number (1 - 99) or if manual inputs (M1 – M4)
H	Hours (0 – 23)
M	Minutes (0 – 59)
S	Seconds (0 – 59)
F	Fraction of seconds (0 – 99999)
D	Day (0 – 32767) starting from 01.01.2000

- **Identification number request (#ID):**
  #ID<TAB><CS16><CR><LF>

- **Print Line (#PL):**
  #PL_XXXXXXXXXXXXXXXXXXXXXXXX**<TAB><CS16><CR><LF>**

X	Text to print (24 bytes)

- **Download (#DL):**
  #DL_RR**<TAB><CS16><CR><LF>**

R	Run number (1 – 99)

- **Recall Time (#RT):**
  #RT_SSSS_CC**<TAB><CS16><CR><LF>**

S	Sequential number (0 – 9999)
C	Channel number (1 - 99)

- **Start List (#SL)**

Delete memorized list:	**#SLR <TAB><CS16><CR><LF>**
Add competitor number in the list:	**#SLA_NNNN<TAB><CS16><CR><LF>**
Close a new list:	**#SLC<TAB><CS16><CR><LF>**

  N=Competitor number

GPRS parameters (#GP):

#GP_*X*<**TAB**><**CS16**><**CR**><**LF**>

X = '**P**' -> Actual parameters printing
X = '**C**' -> Actual parameters deleted

#GP_*X*_*YYYYYYYYYYYYYYYYYYYYYYYYYYYY*<**TAB**><**CS16**><**CR**><**LF**>

X = '**1**' -> Access point name (APN)
X = '**2**' -> User's name (USERNAME)
X = '**3**' -> Password (PASSWORD)
X = '**4**' -> Address or IP n°
X = '**5**' -> Port number

Y = Text (1-28 octets)

Example :

#GP *1 orange*<**TAB**><**CS16**><**CR**><**LF**>
#GP *2* <**TAB**><**CS16**><**CR**><**LF**>
#GP *3* <**TAB**><**CS16**><**CR**><**LF**>
#GP *4 www.chrono.com*<**TAB**><**CS16**><**CR**><**LF**>
#GP *5 7000*<**TAB**><**CS16**><**CR**><**LF**>

Send message to all ports (#BM):

#BM_*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX*<**TAB**><**CS16**><**CR**><**LF**>

X = Message (1 - 32 octets. characters <TAB>, <CR> are not authorized).

Serial port setup (#MC): !!! factory setup!!!

#MC_04660_XXXXX <**TAB**><**CS16**><**CR**><**LF**>

X = Serial N° (0 – 65535)

18. RS232 Display Output Protocol

Official **TAG Heuer** Data String contents for use with numeric display boards:
Data being sent out the **DISPLAY** port of the CP 540 adheres to the following format based on 24 characters:

N°	Nb Characters	Description	Code	Info
1	1	Identification character at the start of the data string	02h	Start of Text
2	1	L character for “Line”	4Ch	
3	1	Number character for line number	0 à 9	Line selector
4	1	Horizontal tab character	09h	
5	1	A Character for “alphanumeric”	41h	
6-8	3	Number characters for competitor number	000 à 999	
9	1	Horizontal tab character	09h	
10-21	12	Characters for time		Hh:Mm:Ss.DCM
22	1	Horizontal tab	09h	
23	1	Carriage Return character	0Dh	
24	1	Line Feed character	0Ah	

Any inactive digit remaining blank, corresponding to character 20 (space) is underlined in our example:
Data string examples for data being sent to display board from the CP 540:

18.1. NET TIME and START – FINISH modes

1. **Competitor number and NET TIME on display 0**

   <STX> L 0 **<HT>** A _ 5 2 **<HT>** _ 5 : 3 1 : 3 6 . 2 9 2 **<HT><CR><LF>**

   Net time of 5 : 3 1 : 3 6 . 2 9 2 for competitor 52 sent to display line 0.

2. **Rank and Competitor number on display 1**

   <STX> L 1 **<HT>** A _ 2 1 **<HT>** _ _ _ _ _ _ 5 2 : _ 2 1 **<HT><CR><LF>**

   Rank of 21 for competitor number 52, sent to display #§ (Rank is sent twice).

3. **Speed Measurement on Display 2**

   <STX> L 2 **<HT>** A _ _ _ **<HT>** _ _ _ _ _ 2 9 2 . 5 9 0 **<HT><CR><LF>**
   Speed of 292.590 km/h sent to display #2.

18.2. DUAL Mode

1. **Left course NET Time sent to display 0**

   <STX> L 0 **<HT>** A _ _ _ **<HT>** _ _ _ _ _ _ 4 9 . 3 6 7 **<HT><CR><LF>**

   Net time of 49.367 seconds for racer on the left course sent to display #0.

2. **Right course NET TIME sent to display 1**

   <STX> L 1 **<HT>** A _ _ _ **<HT>** _ _ _ _ _ _ 4 9 . 8 9 9 **<HT><CR><LF>**

   Net time of 49.899 seconds for racer on the right course sent to display #1.

3. **Calculated Difference of 2 NET TIMES sent to display 2 in DIFFERENTIAL only**

   <STX> L 2 **<HT>** A _ _ _ **<HT>** _ _ _ _ _ z 0 . 5 3 2 _ **<HT><CR><LF>**

   Calculated net time difference of 0.532 seconds sent to display #2

18.3. Miscellaneous Message

1. **General all-clear data string**

   <STX> L _ **<HT>** A _ _ _ **<HT>** _ _ _ _ _ _ _ _ _ _ _ _ _ **<HT><CR><LF>**

   All display locations are sent blanks

2. **Time-of-Day Display**

   <STX> L _**<** **HT>** A _ _ _**<** **HT>** 1 3 : 0 5 : 3 6 _ _ _ _ **<HT><CR><LF>**

   Time-of-Day is 1 3 : 0 5 : 3 6.

3. **Transmission Protocol**

   9600 bauds / 8 Data bits / 1 Stop bit / No parity

18.4. Display with 6 and 9 digits display example:

1. **Single Display with 6 digits:**

   NET TIME on Display 0

   Net time is 39.292 seconds.

2. **Two Displays with 6 digits:**

   NET TIME

   + N° and rank on the display 1 (having address code 0)

   Ex: N° 52 in rank 21st with a NET TIME of 39.292 seconds.

3. **Singel Display with 9 digits:**

   N° and NET TIME are given on the display 1 (having address code 0)

   N° 52 with a net time of 39.292 seconds.

18.5. Single Display with 6 showing SPEED

19. ETHERNET LINK CONFIGURATION

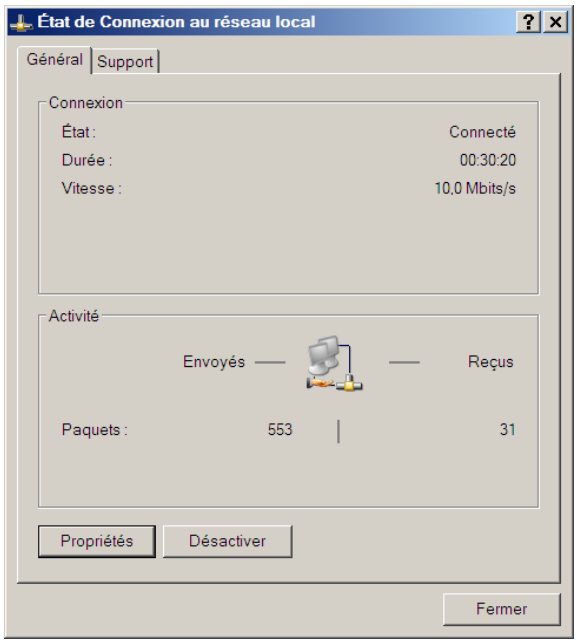
⇒ Connect CP 540 to PC via red Ethernet cable HL540-2.
⇒ Configure the Ethernet configuration on your CP 540 (menu: **Parameters** → **Ethernet** → **ON)**
⇒ Validate the IP address, or change it if necessary (we recommend that you keep the default value at 192.168.001.050).
Note: if you are connecting several CP 540's together via Ethernet, it is imperative to set unique IP addresses for each unit.

Example: CP 540 # 1 IP: 192.168.001.50
CP 540 # 2 IP: 192.168.001.51
Etc…

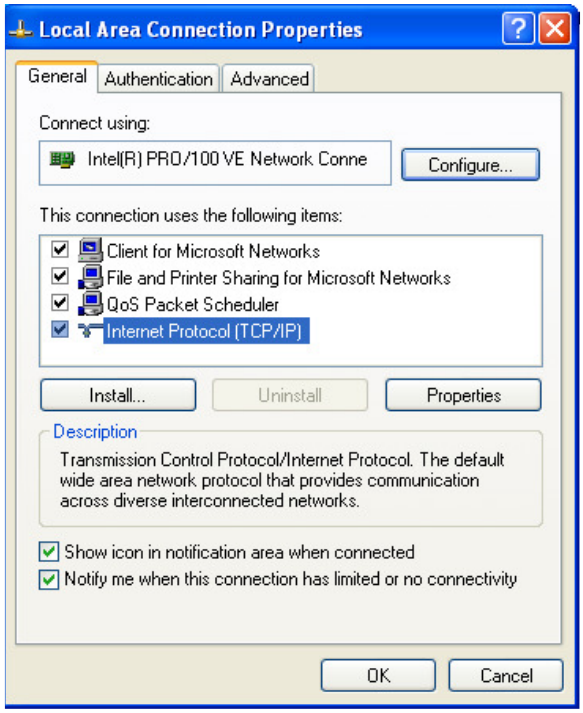
If your PC is already connected to a network server (LAN), its IP address is defined automatically. You should then disconnect from the LAN and configure a special IP address for this application.

19.1. Configuration of your PC IP address

- Select the program **Network connection** (**Start** → **Setting** → **Control Panel**) We suggest that you create a short cut from your desk top to simplify the access to the LAN.
- Select **Local Area Connexion**
- Select **Properties**



- Choose **Internet Protocol TCP/IP**
- Again, select **Properties**

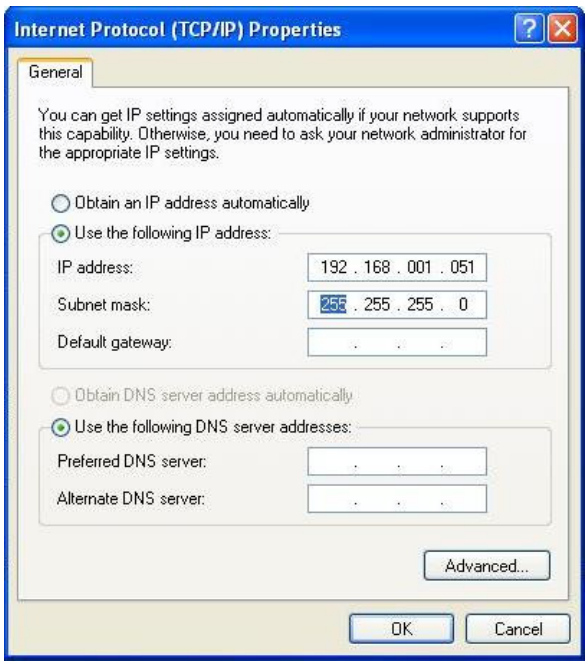


- Select **Use the following IP address**
- Enter the correct IP address
  Example: **192.168.1.51**
  The **Subnet mask** will come automatically (255.255.255.0)

  Note
  The IP addresses should be similar on the first 3 groups of the 3 numbers (example : **192.168.1**)
  The last groups of 3 numbers should be different
  Example:
  CP 540 IP = 192.168.1.**50**
  PC IP = 192.168.1.**51**

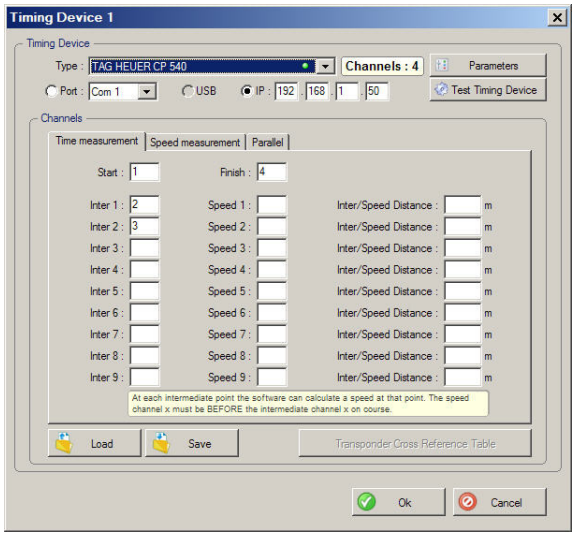
  If your PC is never connected to a LAN, you can make this address permanent.

  If not, to retrieve to the original setting, please select **Obtain an IP address automatically**



19.2. In SKI PRO, MSPORT PRO etc.

- Select the type of Timing Devices and enter the IP address of your CP 540.

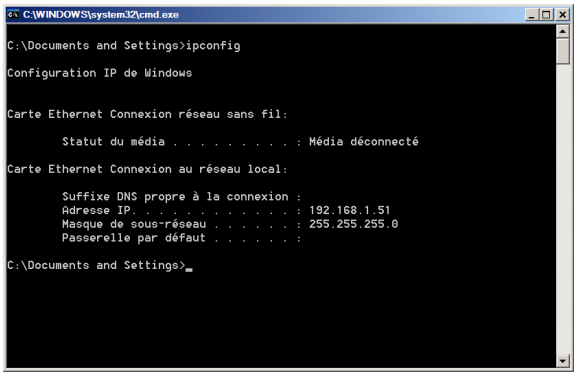


19.3. Ethernet connection test :

To test the Ethernet connection between two systems

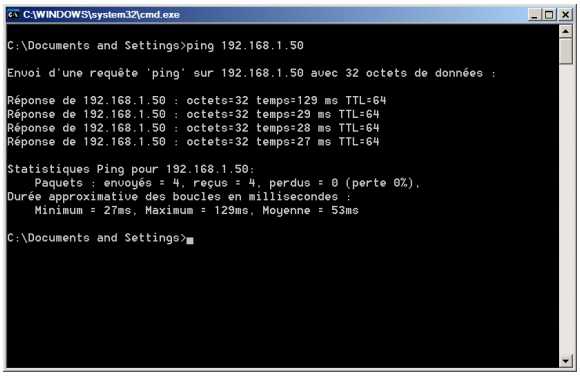
- Select: **Start → Run**
- Enter **CMD** then validate with **OK**

- Enter **IPCONFIG** than validate with **ENTER**
  The IP address of your PC is written as follows:
  Address IP 192.168.1.51



- Enter **PING** followed with the IP address of your CP 540

  PING 192.168.1.50



- If the link is not working, please check carefully the following :
  a) IP address of your PC
  b) IP address of your CP 540
  c) Connexion

20. Technical specifications

⇒ **General**	Stand-alone multi-sport timing system. Timing calculation (Speed) to the 1/1'600'000 sec. Timing resolution (printer – PC) from 1 sec to 1/100'000 sec Memory of 25'500 times and 99 timing sessions Sequential N°/ competitor N° from 1 to 9'999
⇒ **Inputs / Outputs**	Four banana jack inputs for external timing impulses (working contact or closing contact without potential / short-circuit, open collector) COMPUTER / Bidirectional RS232 (or to drive external display) ETHERNET Expansion port for planned Docking Stations.
⇒ **Keyboard**	One key to turn ON the device Numerical keyboard Three keys UP, DOWN and ENTER Four validation keys (E1 – E4) RECALL key Paper feed key Four manual triggering buttons (to block and unblock) the external Inputs.
⇒ **Display**	Matrix LCD display with backlighting. Eight information lines with 21 characters Adjustable contrast and brightness
⇒ **Printer**	Continuous rapid thermal printer 24 characters per line Automatically turns off when batteries are low, or turn off manually.
⇒ **Time Base**	Thermo-compensated quartz 12.8 MHz Precision: +/- 0.5 ppm at 25° C Precision: +/- 1.5 ppm between -30°C and +75°C
⇒ **Operating temperature**	From -20°C to + 60°C Docking Station (available late 2008) recommended for low temperature
⇒ **Internal power supply**	Five alkaline 1.5V batteries (UM3 – Energizer LR6)
⇒ **External power supply**	12 V DC by adaptor (HL540-1) or 12 V batteries
⇒ **Autonomy**	6'000 printed times from fresh set of batteries (Energizer)
⇒ **Case**	Glass-filled Polyester P66 / Santoprene
⇒ **Dimensions / Weight**	270 x 100 x 65 mm CP540 without transport case: 860g (with battery set and 1 paper roll) CP540 with transport case and power supply: 1'800g

PLEASE NOTE

Some technical specifications could be modified or improved without any advise. This is to guarantee the evolution of our devices and accessories.

21. Note

TAGHeuer

PROFESSIONAL TIMING

TAG Heuer
PROFESSIONAL TIMING
6A Louis-Joseph Chevrolet
2300 la Chaux-de-Fonds
Switzerland
Tel : 032 919 8000
Fax : 032 919 9026

info@tagheuer-timing.com
www.tagheuer-timing.com